```
     FILE 'REGISTRY' ENTERED AT 11:24:34 ON 07 DEC 2006
                E SULFUR/CN
L14             1 SEA SULFUR/CN

     FILE 'HCA' ENTERED AT 11:24:49 ON 07 DEC 2006
L15        138976 SEA L14
L16            12 SEA L1 AND (L2 OR ((L5 OR L12) AND (L6 OR L15))) AND L4
                  AND L7
L17            12 SEA L8 OR L13 OR L16
L18            11 SEA L9 NOT L17
L19            18 SEA L10 NOT (L17 OR L18)
L20             8 SEA L17 AND 1840-2002/PY,PRY
L21             8 SEA L18 AND 1840-2002/PY,PRY
L22            16 SEA L19 AND 1840-2002/PY,PRY

     FILE 'REGISTRY' ENTERED AT 11:33:04 ON 07 DEC 2006
L23          9563 SEA (LI (L) P (L) O)/ELS
L24            20 SEA L23 (L) 3/ELC.SUB
L25            68 SEA L23 (L) N/ELS (L) 4/ELC.SUB

     FILE 'HCA' ENTERED AT 14:51:25 ON 07 DEC 2006
L26            30 SEA L24
L27           170 SEA L25
L28            11 SEA L26 AND L1
L29               QUE ELECTROD## OR CATHOD## OR ANOD##
L30               QUE (52 OR 72)/SC,SX
L31            11 SEA L26 AND (L29 OR L30)
L32            11 SEA L28 OR L31
L33             8 SEA L32 AND 1840-2002/PY,PRY
L34           147 SEA L27 AND L1
L35           125 SEA L27 AND L29
L36           152 SEA L27 AND L30
L37            19 SEA (L34 OR L35 OR L36) AND (L2 OR ((L5 OR L12) AND (L6
                  OR L15)))
L38          5406 SEA (PRETREAT? OR PRE(W)TREAT?)(2A)L3
L39             1 SEA L27 AND L38
L40            21 SEA L27 AND L7
L41             9 SEA L37 AND L40
L42            76 SEA L27 AND (ANOD## OR (NEG# OR NEGATIV?)(2A)ELECTROD##)

L43            58 SEA L42 AND L12
L44            10 SEA L42 AND L15
L45             9 SEA L43 AND L44
L46            10 SEA L42 AND L2
L47            36 SEA L27 AND L4
L48            10 SEA L47 AND L7
L49            31 SEA L37 OR L39 OR L40 OR L41 OR L45 OR L46 OR L48
```

L50 22 SEA L49 AND 1840-2002/PY,PRY

=> FILE HCA
FILE 'HCA' ENTERED AT 15:10:43 ON 07 DEC 2006


=> D L33 1-8 CBIB ABS HITSTR HITIND

L33 ANSWER 1 OF 8 HCA COPYRIGHT 2006 ACS on STN
144:91111 Method for fabrication of rechargeable thin film **battery**. Goldner, Ronald B.; Liu, Te-Yang; Goldner, Mark A.; Gerouki, Alexandra; Haas, Terry E. (Trustees of Tufts College, USA). U.S. US 6982132 B1 20060103, 25 pp., Cont.-in-part of U.S. Ser. No. 951,085, abandoned. (English). CODEN: USXXAM. APPLICATION: US 2000-638444 20000814. PRIORITY: US 1997-951085 19971015.

AB A rechargeable, stackable, thin film, solid-state lithium **electrochem. cell**, thin film lithium **battery** and method for making the same is disclosed. The cell and **battery** provide for a variety configurations, voltage and current capacities. An innovative low temp. ion beam assisted deposition method for fabricating thin film, solid-state **anodes**, **cathodes** and electrolytes is disclosed wherein a source of energetic ions and evaporants combine to form thin film cell components having preferred crystallinity, structure and orientation. The disclosed **batteries** are particularly useful as power sources for portable electronic devices and elec. vehicle applications where high energy d., high reversible charge capacity, high discharge current and long **battery** lifetimes are required.

IT **168886-50-8**, Lithium phosphorus oxide
(method for fabrication of rechargeable thin film **battery**
)
RN 168886-50-8 HCA
CN Lithium phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

INCL 429162000; 429152000; 429160000; 429231100; 429231300; 429231800; 429245000; 429319000; 429322000; 029623500
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** rechargeable thin film fabrication method
IT Secondary **batteries**
(lithium; method for fabrication of rechargeable thin film **battery**)
IT Electric vehicles
Films
Ion beams
(method for fabrication of rechargeable thin film **battery**)
IT Alloys, uses
Nitrides
(method for fabrication of rechargeable thin film **battery**)
IT Electric apparatus
(portable; method for fabrication of rechargeable thin film **battery**)
IT Evaporation
(thermal; method for fabrication of rechargeable thin film **battery**)
IT 7429-90-5, Aluminum, uses 7439-93-2D, Lithium, intercalation compd. 7440-02-0, Nickel, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7782-42-5, Graphite, uses 11099-19-7 11104-61-3, Cobalt oxide 11113-67-0, Iron lithium oxide 11115-87-0, Hafnium nitride 11116-16-8, Titanium nitride 11126-15-1, Lithium vanadium oxide 12033-62-4, Tantalum nitride 12646-13-8, Aluminum lithium silicate 12648-34-9, Niobium nitride 12674-04-3, Vanadium nitride 39300-70-4, Lithium nickel oxide 39302-37-9, Lithium titanium oxide 39448-96-9, Graphite lithium 39457-42-6, Lithium manganese oxide 51177-06-1, Chromium lithium oxide 52627-24-4, Cobalt lithium oxide 119173-61-4, Zirconium nitride 160479-36-7, Lithium tin oxide 163612-99-5, Indium lithium tin oxide **168886-50-8**, Lithium phosphorus oxide 184905-46-2, Lithium nitrogen phosphorus oxide 872345-59-0, Indium lithium oxide 872345-60-3
(method for fabrication of rechargeable thin film **battery**)

L33 ANSWER 2 OF 8 HCA COPYRIGHT 2006 ACS on STN
142:97432 Production of thin-film electrolyte. Bae, Jun Hyun; Baik, Hong Koo; Jung, Sang Heon; Kim, U. Jin; Lee, Seung Ju; Lee, Sung Man (S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2002063681 A **20020805**, No pp. given (Korean). CODEN: KRXXA7.
APPLICATION: KR 2001-4262 20010130.

AB This thin-film electrolyte has at least 2 network formers, it has good cycling properties and stability and has low reactivity with **electrodes** and a long cycle lifetime. The thin film electrolyte contains Li, P, O, X, and Y atoms, where one of X and Y is a substance network forming substance such as Si, B, S, and the other is a substance modifying the network structure, Ag, N, S. The thin-film electrolyte contg. Li, P, O, Si, and N is produced by using a target providing Li, P, O, Si followed by sputtering in a vacuum and then in N2.

IT **168886-50-8D**, Lithium phosphorus oxide, compd. with silicon or boron or sulfur and with silver or nitrogen or sulfur (prodn. of thin-film electrolyte)

RN 168886-50-8 HCA

CN Lithium phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M006-18

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

IT **Battery** electrolytes
Electrolytes
(prodn. of thin-film electrolyte)

IT **168886-50-8D**, Lithium phosphorus oxide, compd. with silicon or boron or sulfur and with silver or nitrogen or sulfur (prodn. of thin-film electrolyte)

L33 ANSWER 3 OF 8 HCA COPYRIGHT 2006 ACS on STN

142:77582 Producing of lithium phosphate sputtering target for manufacture of LiPON electrolytes for thin film lithium **batteries**. Cho, Byeong Won; Cho, Won Il; Jun, Eun Jeong; Nam, Sang Cheol; Shin, Yeong Hwa; Song, Jong Han; Yoon, Yeong Su (Korea Institute of Science and Technology, S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2002007881 A **20020129**, No pp. given (Korean). CODEN: KRXXA7. APPLICATION: KR 2000-41408 20000719.

AB This method for producing a Li phosphate sputtering target improves the quality of the target and LiPON with excellent electrolyte properties can be obtained. The method entails calcining powders of Li phosphate at 600-950°, pulverizing the calcined powders, compress-molding the pulverized powder, and sintering the molded body at 500-1500°. A binder is added to improve the molding before compress-molding is performed. Li phosphate powder is

represented by LixPyO4 with x = 2.5-3.5 and y = 0.7-1.3.

IT **168886-50-8P**, Lithium phosphorus oxide
(lithium phosphate sputtering target for manuf. of LiPON electrolytes for lithium **batteries**)

RN 168886-50-8 HCA

CN Lithium phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M010-38

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium phosphate sputtering target LiPON electrolyte lithium **battery**

IT **Battery** electrolytes
Sputtering targets
(lithium phosphate sputtering target for manuf. of LiPON electrolytes for lithium **batteries**)

IT **168886-50-8P**, Lithium phosphorus oxide
(lithium phosphate sputtering target for manuf. of LiPON electrolytes for lithium **batteries**)

IT 184905-46-2P, Lithium nitrogen phosphorus oxide
(lithium phosphate sputtering target for manuf. of LiPON electrolytes for lithium **batteries**)

L33 ANSWER 4 OF 8 HCA COPYRIGHT 2006 ACS on STN

139:182767 Li3PO4:N/LiCoO2 coatings for thin film **batteries**. Gross, M. E.; Martin, P. M.; Stewart, D. C.; Johnston, J. W.; Windisch, C. F.; Graff, G. L.; Rissmiller, P. L.; Dudeck, E. L. (Pacific Northwest National Laboratory, Richland, WA, USA). Annual Technical Conference Proceedings - Society of Vacuum Coaters, 45th, 119-124 (English) **2002**. CODEN: ATCCDI. ISSN: 0731-1699. Publisher: Society of Vacuum Coaters.

AB Li3PO4:N (LIPON)/Li1.04CoO2 thin film **battery** structures were deposited up to 2 μm thick were deposited using a 15.2 cm diam. Li2.9PO3.5 pressed powder target for reactive RF magnetron sputtering. Li1.04CoO2 thin films were deposited using a 15.2 cm diam. LiCoO2 pressed powder target. LIPON films were deposited in an ultra pure N2 atmosphere and LiCoO2 films were deposited in an ultra pure atm. of Ar + O2. Total chamber pressure during deposition ranged between 5 and 20 mtorr and RF power to the sputtering targets ranged from 100 W to 450 W. Because XPS gave ambiguous compositional results, the films were optimized for a.c.

and d.c. cond. Elec. cond. was extremely sensitive to deposition conditions, deposition rate, sputtering gas pressure, and reactive gas partial pressure. AC cond. measurements were made at a frequency of 10 kHz, and were correlated to d.c. cond. measurements. LIPON films had the highest conductivities in the 660 nS cm-1 range and the highest a.c. cond. of Li1.04CoO2 films was .apprx.0.24 S cm-1. Earlier work showed the most conductive films were deposited at 20 mtorr pressures and target powers of 100 W. This work has scaled up to conductive films being deposited at 7.5 mtorr pressures and target powers of 400 W. X-ray diffraction anal. showed that the films were mostly amorphous. Films deposited under these conditions were transparent at visible wavelengths with a refractive index of 1.6. Lower cond. films were brownish in appearance and had less transmission than films with high cond. The rechargeable **battery** structure consisting of an alumina substrate, gold current collector, 0.5-μm Li1.04CoO2 **cathode**, 1.2-μm LIPON electrolyte, Li metal **anode**, and a copper current collector are currently under test. Early thin film **battery** cycle testing was successful, addnl. testing is on-going. Performance results are correlated with film properties and reported. Future work will involve optimization of **battery** performance on a large scale and scale up of the deposition process to include flexible web processing.

IT **581094-51-1**, Lithium metaphosphate oxide (Li2.9(PO3)O0.5) (pressed powder target; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

RN 581094-51-1 HCA

CN Lithium metaphosphate oxide (Li2.9(PO3)O0.5) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | 0.5 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.9 | 7439-93-2 |

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 57

ST Li3PO4 LiCoO2 coating thin film reactive RF magnetron sputtering; XRD secondary lithium **battery** electrolyte **electrode** cond SEM voltammetry

IT **Battery electrodes**
**Battery** electrolytes
Cyclic voltammetry
Electric conductivity
Electric impedance
Secondary **batteries**

(Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Ceramics
(coated substrate; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Polyimides, uses
(coated substrate; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Glass, uses
(gold-coated, coated substrate; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Reactive sputtering
(radio-frequency, magnetron; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Magnetron sputtering
(radio-frequency, reactive; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT Crystal structure
(rhombohedral (LiCoO2 film); Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 203402-92-0P, Lithium nitride phosphate
(LIPON, sputtered layer; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 7727-37-9, Nitrogen, reactions
(Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 7439-93-2, Lithium, uses 12142-83-5, Tin nitride (Sn3N4)
(**anode**; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 1344-28-1, Alumina, uses 7440-32-6, Titanium, uses 60676-86-0, Fused silica
(coated substrate; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 7429-90-5, Aluminum, uses
(foil; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 7440-50-8, Copper, uses
(gold-coated, coated substrate, and **anode**; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 12190-79-3, Cobalt lithium oxide (CoLiO2)
(pressed powder target; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT **581094-51-1**, Lithium metaphosphate oxide (Li2.9(PO3)O0.5)
(pressed powder target; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

IT 152829-46-4P, Cobalt lithium oxide (CoLi1.04O2)
(sputtered layer, **cathode**; Li3PO4:N/LiCoO2 coatings for

thin film secondary **batteries**)

IT 7440-57-5, Gold, uses
(substrate coating; Li3PO4:N/LiCoO2 coatings for thin film secondary **batteries**)

L33 ANSWER 5 OF 8 HCA COPYRIGHT 2006 ACS on STN

125:119400 Thin-film rechargeable lithium **batteries**. Dudney, N. J.; Bates, J. B.; Lubben, Dan (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN, 37831-6030, USA). Ceramic Transactions, 65(Role of Ceramics in Advanced Electrochemical Systems), 113-127 (English) **1996**. CODEN: CETREW. ISSN: 1042-1122. Publisher: American Ceramic Society.

AB Thin-film rechargeable lithium **batteries** using ceramic electrolyte and **cathode** materials were fabricated by phys. deposition techniques. The lithium phosphorus oxynitride electrolyte has exceptional electro-chem. stability and a good lithium cond. The lithium insertion reaction of several different intercalation materials, amorphous V2O5, amorphous LiMn2O4, and cryst. LiMn2O4 films, was investigated using the **cathode** /electrolyte/lithium thin-film **battery**.

IT **150926-89-9**, Lithium metaphosphate oxide Li2.7(PO3)O0.9
(manuf. of thin-film lithium **batteries** with ceramic electrolyte of)

RN 150926-89-9 HCA

CN Lithium metaphosphate oxide (Li2.7(PO3)O0.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | 0.9 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.7 | 7439-93-2 |

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium thin film **battery** manuf; phosphorus lithium oxynitride electrolyte **battery** manuf; manganese lithium oxide **cathode battery** manuf; vanadium oxide **cathode** lithium **battery** manuf

IT **Batteries**, secondary
(manuf. of thin-film lithium **batteries**)

IT 12057-17-9, Lithium manganese oxide (LiMn2O4)
(amorphous and cryst.; manuf. of thin-film lithium **batteries** with **cathode** of)

IT 1314-62-1, Vanadium oxide (V2O5), uses
(manuf. of thin-film lithium **batteries** with **cathode** of)

IT 150499-38-0, Lithium metaphosphate nitride oxide

(Li3.1(PO3)N0.16O0.8) 150499-39-1, Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3) 150499-40-4, Lithium metaphosphate nitride oxide (Li3.3(PO3)N0.22O0.8) **150926-89-9**, Lithium metaphosphate oxide Li2.7(PO3)O0.9 179679-48-2, Lithium oxide phosphate silicate (Li3.6O0.2(PO4)0.81(SiO4)0.19)
(manuf. of thin-film lithium **batteries** with ceramic electrolyte of)

L33 ANSWER 6 OF 8 HCA COPYRIGHT 2006 ACS on STN
123:345668 Electrochemical devices having a metal phosphide **electrode** active mass for excellent cycle properties.
Takada, Kazunori; Nitsuta, Yoshiaki; Kondo, Shigeo (Matsushita Electric Ind Co Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 07122261 A2 **19950512** Heisei, 8 pp. (Japanese). CODEN: JKXXAF.
APPLICATION: JP 1993-266943 19931026.

AB Electrochem. devices such as Li **batteries**, electrochem. display devices, elec. double layer capacitors, etc. have ≥1 **electrode** composed of a metal phosphide or a compd. contg. mainly a metal phosphide, e.g. alkali metal phosphides, alk. earth phosphide, etc., more concretely Li phosphide, Na phosphide, Mg phosphide, Ca phosphide, etc. Li+ and Li+ clusters, for example, which involve an electrochem. reversible reaction are formed in the surface and the interlayer of Li phosphide in the case of using Li phosphide as an **electrode** active mass and carrying out redox in a Li **battery**'s electrolyte, resulting in excellent cycle properties of the electrochem. devices.

IT **168886-50-8**, Lithium phosphorus oxide
(**electrode** active mass for **electrodes** of electrochem. devices)
RN 168886-50-8 HCA
CN Lithium phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-02
ICS H01M004-58; H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST alkali phosphide **electrode** electrochem device; alk earth phosphide **electrode** device; **battery** **electrode** metal phosphide; capacitor **electrode** metal phosphide
IT Phosphides

(alk. earth metal; **electrode** active mass for **electrodes** of electrochem. devices)

IT **Electrodes**
Optical imaging devices
(metal phosphide for **electrodes** of electrochem. devices)

IT Electric capacitors
(double-layer, metal phosphide for **electrodes** of electrochem. devices)

IT Alkali metal pnictides
(phosphides, **electrode** active mass for **electrodes** of electrochem. devices)

IT 1305-99-3, Calcium phosphide 1314-84-7, Zinc phosphide (Zn3P2) 12057-74-8, Magnesium phosphide 12643-19-5, Copper phosphide 20859-73-8, Aluminum phosphide 24167-76-8, Sodium phosphide 168886-48-4, Lithium iodide phosphide 168886-49-5, Lithium bromide phosphide **168886-50-8**, Lithium phosphorus oxide
(**electrode** active mass for **electrodes** of electrochem. devices)

IT 12057-29-3P, Lithium phosphide (Li3P)
(**electrode** active mass for **electrodes** of electrochem. devices)

L33 ANSWER 7 OF 8 HCA COPYRIGHT 2006 ACS on STN

120:168921 Lithium **batteries** having high-capacity **cathodes**. Kamauchi, Masaharu (Mitsubishi Cable Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 05325960 A2 **19931210** Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-124593 19920518.

AB In the **batteries** having Li or Li alloy **anodes**, **cathodes**, and electrolytes, **cathode** active masses comprise Li P composite oxides. The **batteries** have high energy d. giving high emf. and discharge voltage.

IT **153593-61-4**, Lithium phosphorus oxide (LiPO1-3)
(**cathodes** contg., in lithium **batteries**, for high energy d.)

RN 153593-61-4 HCA

CN Lithium phosphorus oxide (LiPO1-3) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | 1 - 3 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 1 | 7439-93-2 |

IC ICM H01M004-58

CC **52-2** (Electrochemical, Radiational, and Thermal Energy

Technology)
ST lithium phosphorus oxide **cathode battery**
IT **Cathodes**
(**battery**, lithium phosphorus oxides, in lithium **batteries**, for high energy d.)
IT **153593-61-4**, Lithium phosphorus oxide (LiPO1-3)
(**cathodes** contg., in lithium **batteries**, for high energy d.)

L33 ANSWER 8 OF 8 HCA COPYRIGHT 2006 ACS on STN
119:229988 Fabrication and characterization of amorphous lithium electrolyte thin films and rechargeable thin-film **batteries**. Bates, J. B.; Dudney, N. J.; Gruzalski, G. R.; Zuhr, R. A.; Choudhury, A.; Luck, C. F.; Robertson, J. D. (Oak Ridge Natl. Lab., Oak Ridge, TN, 37830, USA). Journal of Power Sources, 43(1-3), 103-10 (English) **1993**. CODEN: JPSODZ. ISSN: 0378-7753.
AB Amorphous Li oxide and oxynitride thin films were synthesized by radio-frequency magnetron sputtering of Li silicates and Li phosphates in Ar, Ar + O, Ar + N, or N. The compn., structure, and elec. properties of the films were detd. using ion and electron beam, x-ray, optical, photoelectron, and a.c. impedance techniques. For Li phosphosilicate films, ion cond. ≤1.4 + 10-6 S/cm at 25° was obsd., but none of the films were stable in contact with Li. A thin-film Li P oxynitride electrolyte prepd. by sputtering Li3PO4 in pure N had cond. of 2 + 10-6 S/cm at 25° and excellent long-term stability in contact with Li. Thin-film cells of 1-μm-thick amorphous V2O5 **cathode**, 1-μm-thick oxynitride electrolyte film, and 5-μm-thick Li **anode** were cycled between 3.7 and 1.5 V at discharge rate of ≤100 μA/cm2 and charge rate of ≤20 μA/cm2. The open-circuit voltage of 3.6-3.7 V of fully-charged cells remained virtually unchanged after months of storage.
IT **150926-89-9**, Lithium metaphosphate oxide (Li2.7(PO3)O0.9)
(elec. cond. and stability of thin-film, for electrolytes, for lithium **batteries**)
RN 150926-89-9 HCA
CN Lithium metaphosphate oxide (Li2.7(PO3)O0.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| O | 0.9 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.7 | 7439-93-2 |

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): **72**

ST lithium vanadium oxide **battery** electrolyte; phosphorus lithium oxynitride electrolyte **battery**

IT **Battery** electrolytes
(lithium phosphorus oxynitrides and lithium oxides, thin-film sputtered, cond. and stability of)

IT **Batteries**, secondary
(lithium/vanadium pentoxide, thin-film, performance of)

IT Sputtering
(radio-frequency, of lithium phosphorus oxynitrides and lithium oxides, for **battery** electrolytes)

IT 7439-93-2, Lithium, uses
(**anodes**, stability of lithium phosphorus oxynitride electrolyte in contact with, in **batteries**)

IT 1314-62-1, Vanadium oxide (V2O5), uses
(**cathodes**, stability of lithium phosphorus oxynitride electrolyte in contact with, in **batteries**)

IT 150499-38-0, Lithium metaphosphate nitride oxide (Li3.1(PO3)N0.16O0.8) 150499-39-1, Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3) 150499-40-4, Lithium metaphosphate nitride oxide (Li3.3(PO3)N0.22O0.8) 150499-42-6, Lithium oxide phosphate silicate (Li3.6O0.16(PO4)0.82(SiO4)0.19) **150926-89-9**, Lithium metaphosphate oxide (Li2.7(PO3)O0.9)
(elec. cond. and stability of thin-film, for electrolytes, for lithium **batteries**)

```
=> FILE REG
FILE 'REGISTRY' ENTERED AT 11:28:49 ON 07 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.
COPYRIGHT (C) 2006 American Chemical Society (ACS)


=> DISPLAY HISTORY FULL L1-

     FILE 'HCA' ENTERED AT 11:13:58 ON 07 DEC 2006
L1       229436 SEA BATTERY OR BATTERIES OR (ELECTROCHEM? OR GALVANI? OR
                ELECTROLY? OR WET OR DRY OR PRIMARY OR SECONDARY)(2A)(CEL
                L OR CELLS) OR WETCELL? OR DRYCELL?
L2         4160 SEA (LITHIUM# OR LITHIAT? OR LI)(3A)(SULFUR# OR SULFER#
                OR SULPHUR# OR SULPHER# OR S)

     FILE 'LCA' ENTERED AT 11:16:11 ON 07 DEC 2006
L3         7651 SEA (FILM? OR THINFILM? OR LAYER? OR OVERLAY? OR
                OVERLAID? OR LAMIN? OR LAMEL? OR SHEET? OR LEAF? OR
                FOIL? OR COAT? OR TOPCOAT? OR OVERCOAT? OR VENEER? OR
                SHEATH? OR COVER? OR ENVELOP? OR ENCAS? OR ENWRAP? OR
                OVERSPREAD?)/BI,AB

     FILE 'HCA' ENTERED AT 11:17:23 ON 07 DEC 2006
L4       106244 SEA (CONDUCT? OR COND#)(2A)(PRETREAT? OR PRE(W)TREAT? OR
                FILM? OR THINFILM? OR LAYER? OR OVERLAY? OR OVERLAID? OR
                LAMIN? OR LAMEL? OR SHEET? OR LEAF? OR FOIL? OR COAT? OR
                TOPCOAT? OR OVERCOAT? OR VENEER? OR SHEATH? OR COVER? OR
                ENVELOP? OR ENCAS? OR ENWRAP? OR OVERSPREAD?)
L5         36015 SEA (LITHIUM# OR LITHIAT? OR LI)(2A)(ION## OR CATION?)
L6          2461 SEA (CATHOD## OR (POS# OR POSITIV?)(2A)ELECTROD##)(3A)(SU
                LFUR# OR SULFER# OR SULPHER# OR SULPHUR# OR S)
L7         91610 SEA PROTECT?(2A)(FILM? OR THINFILM? OR LAYER? OR
                OVERLAY? OR OVERLAID? OR LAMIN? OR LAMEL? OR SHEET? OR
                LEAF? OR FOIL? OR COAT? OR TOPCOAT? OR OVERCOAT? OR
                VENEER? OR SHEATH? OR COVER? OR ENVELOP? OR ENCAS? OR
                ENWRAP? OR OVERSPREAD?)
L8             6 SEA L1 AND (L2 OR (L5 AND L6)) AND L4 AND L7
L9            17 SEA L1 AND (L2 OR (L5 AND L6)) AND L7
L10           24 SEA L1 AND (L2 OR (L5 AND L6)) AND L4

     FILE 'REGISTRY' ENTERED AT 11:22:54 ON 07 DEC 2006
                E LITHIUM/CN
L11            1 SEA LITHIUM/CN

     FILE 'HCA' ENTERED AT 11:23:04 ON 07 DEC 2006
L12        82487 SEA L11
L13            6 SEA L1 AND (L2 OR ((L5 OR L12) AND L6)) AND L4 AND L7
```

FILE 'REGISTRY' ENTERED AT 11:24:34 ON 07 DEC 2006
E SULFUR/CN
L14 1 SEA SULFUR/CN

FILE 'HCA' ENTERED AT 11:24:49 ON 07 DEC 2006
L15 138976 SEA L14
L16 12 SEA L1 AND (L2 OR ((L5 OR L12) AND (L6 OR L15))) AND L4 AND L7
L17 12 SEA L8 OR L13 OR L16
L18 11 SEA L9 NOT L17
L19 18 SEA L10 NOT (L17 OR L18)
L20 8 SEA L17 AND 1840-2002/PY,PRY
L21 8 SEA L18 AND 1840-2002/PY,PRY
L22 16 SEA L19 AND 1840-2002/PY,PRY

=> FILE HCA
FILE 'HCA' ENTERED AT 11:29:01 ON 07 DEC 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.


=> D L20 1-8 CBIB ABS HITSTR HITIND

L20 ANSWER 1 OF 8 HCA COPYRIGHT 2006 ACS on STN
143:81150 Chemical protection of a lithium surface. De Jonghe, Lutgard; Visco, Steven J.; Nimon, Yevgeniy S.; Sukeshini, A. Mary (Polyplus Battery Co., USA). U.S. US 6911280 B1 20050628, 16 pp. (English). CODEN: USXXAM. APPLICATION: US 2002-327682 20021220. PRIORITY: US 2001-342326P 20011221.

AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alk. earth metals with incompatible processing and operating environments by creating a ionically **conductive** chem. **protective layer** on the lithium or other reactive metal surface. Such a chem. produced surface **layer** can **protect** lithium metal from reacting with oxygen, nitrogen or moisture in ambient atm. thereby allowing the lithium material to be handled outside of a controlled atm., such as a dry room. Prodn. processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form neg. electrodes for lithium metal **batteries**.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(chem. protection of lithium surface)

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M002-08
ICS H01M010-04; H01M010-26
INCL 429137000; 429246000; 429231900; 429231950; 429309000; 429319000; 429320000; 429321000; 429322000; 429126100
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 57
ST **battery** lithium surface chem protection
IT **Battery** anodes
**Battery** electrolytes
**Coating** materials
Electric conductors, glass
Evaporation
Glass ceramics
Polymer electrolytes
(chem. **protection** of lithium surface)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate **7439-93-2**, Lithium, uses 7440-09-7, Potassium, uses 7440-23-5, Sodium, uses 7440-50-8, Copper, uses **7704-34-9**, Sulfur, uses 70780-99-3, Lisicon 77641-62-4, Nasicon 302600-21-1
(chem. protection of lithium surface)

L20 ANSWER 2 OF 8 HCA COPYRIGHT 2006 ACS on STN
140:378090 Anodes for **lithium-sulfur batteries**, their manufacture, and **lithium-sulfur batteries** using them. Lee, Jong Ki; Lee, Je Won; Cho, Joung Keun; Lee, Sang Muk; Kim, Min Hyup (Samsung SDI Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2004139968 A2 20040513, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-276606 20030718. PRIORITY: KR 2002-63834 20021018.
AB The anodes for **lithium-sulfur batteries** are manufd. by forming a pretreatment layer (thickness 50-5000 Å) contg. Li+-conductive substances having ionic cond. ≥1 + 10-10 **S**/cm on **Li** metal by vapor deposition under inert gas atm. and forming a Li metal-**protective film** by vapor deposition. Preferably,

the Li+-conductive substance may be Li3PO4 and the **protective layer** contains Li2.9PO3.3N0.46. **Lithium-sulfur batteries** contain the anodes above and cathodes contg. cathode active materials selected from S element, S-series compds., and their mixts. The anode pretreatment layer shows high ionic cond. and no vol. expansion.

IT **7704-34-9, Sulfur,** uses
(**cathode;** manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **7439-93-2,** Lithium, uses
(manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

IC ICM H01M004-02
ICS H01M004-04; H01M004-40; H01M004-62; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ST **lithium sulfur battery** anode
**lithium** phosphate; phosphorus oxynitride lithium anode **battery**

IT Controlled atmospheres
(inert, in vapor deposition; manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT Secondary **batteries**
(**lithium-sulfur;** manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **Battery** anodes
**Battery cathodes**
Ionic conductors

Vapor deposition process
(manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **7704-34-9, Sulfur,** uses
(**cathode;** manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT 7440-01-9, Neon, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses
(inert atm. in vapor deposition; manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **7439-93-2,** Lithium, uses
(manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT 10377-52-3, Lithium phosphate
(pretreatment layer; manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT 150499-39-1, Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3)
(**protective layer;** manuf. of **lithium-sulfur battery** anodes having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

L20 ANSWER 3 OF 8 HCA COPYRIGHT 2006 ACS on STN
136:137424 Fabrication of lithium anodes and **batteries.**
Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.; Affinito, John (USA). U.S. Pat. Appl. Publ. US 2002012846 A1 **20020131,** 22 pp., Cont.-in-part of U.S. Ser. No. 721,578. (English). CODEN: USXXCO. APPLICATION: US 2001-864890 20010523. PRIORITY: US 1999-167171P 19991123; US 2000-721578 20001121; US 2000-721519 20001121.

AB Provided is an anode for use in **electrochem. cells**, wherein the anode active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion **conducting layers** and polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate **protective layer,** such as a temporary **protective** metal **layer,** on the surface

of the lithium-contg. first layer. Another aspect of the invention provides an anode active layer formed by the in-situ deposition of lithium vapor and a reactive gas. The anodes of the current invention are particularly useful in **electrochem.** **cells** comprising **sulfur**-contg. **cathode** active materials, such as elemental sulfur.

IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses
(fabrication of **lithium** anodes and **batteries**)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M004-40
ICS H01M004-66; B05D005-12
INCL 429231950
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** anode lithium; **sulfur** contg **cathode** **battery** **lithium** anode
IT Polyesters, uses
(acrylates; fabrication of lithium anodes and **batteries**)
IT **Battery** anodes
(fabrication of lithium anodes and **batteries**)
IT Acrylic polymers, uses
(fabrication of lithium anodes and **batteries**)
IT Polyoxyalkylenes, uses
(fabrication of lithium anodes and **batteries**)
IT Hydrocarbons, uses
(fabrication of lithium anodes and **batteries**)
IT Borate glasses
(lithium borate; fabrication of lithium anodes and **batteries**)
IT Phosphate glasses
(lithium phosphate; fabrication of lithium anodes and **batteries**)
IT Sulfide glasses
(lithium phosphosulfide; fabrication of lithium anodes and **batteries**)
IT Silicate glasses

(lithium silicate; fabrication of lithium anodes and **batteries**)

IT Secondary **batteries**
(lithium; fabrication of lithium anodes and **batteries**)

IT 7631-86-9, Fumed silica, uses
(colloidal; fabrication of lithium anodes and **batteries**)

IT 110-71-4 646-06-0, 1,3-Dioxolane 1344-28-1, Dispal 11N7-12, uses **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses 12031-63-9, Lithium niobium oxide (LiNbO3) 12769-51-6, Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 90076-65-6, Lithium bis(trifluoromethylsulfonyl)imide 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 342379-43-5, Germanium lithium sulfide
(fabrication of **lithium** anodes and **batteries**)

IT 9002-89-5, Airvol 125 25322-68-3, Peo 64401-02-1, CD 9038 221629-51-2, CN 984
(fabrication of lithium anodes and **batteries**)

IT 74-85-1, Ethylene, uses 74-86-2, Acetylene, uses 124-38-9, Carbon dioxide, uses 7440-50-8, Copper, uses 7446-09-5, Sulfur dioxide, uses 7727-37-9, Nitrogen, uses
(fabrication of lithium anodes and **batteries**)

L20 ANSWER 4 OF 8 HCA COPYRIGHT 2006 ACS on STN

135:7791 Lithium anodes for **electrochemical cells**.
Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.; Affinito, John (Moltech Corporation, USA). PCT Int. Appl. WO 2001039302 A1 **20010531**, 39 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32232 20001121. PRIORITY: US 1999-PV167171 19991123.

AB Provided is an anode for use in **electrochem. cells**, wherein the anode active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion **conducting layers** and crosslinked polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate **protective layer**, such as a temporary **protective** metal **layer**, or plasma CO2 treatment layers on the surface of the lithium-contg.

first layer. The anodes of the current invention are particularly useful in **electrochem. cells** comprising **sulfur**-contg. **cathode** active materials, such as elemental sulfur.

IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses
(**lithium** anodes for **electrochem. cells**)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M004-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery** anode
IT **Battery** anodes
(lithium anodes for **electrochem. cells**)
IT Acrylic polymers, uses
(lithium anodes for **electrochem. cells**)
IT Glass, uses
(lithium anodes for **electrochem. cells**)
IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium oxide 12627-14-4, Lithium silicate 12676-27-6 12769-51-6, Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide
(glass; lithium anodes for **electrochem. cells**)
IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses
(**lithium** anodes for **electrochem. cells**)
IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7440-31-5, Tin, uses 7440-66-6, Zinc, uses
(lithium anodes for **electrochem. cells**)

L20 ANSWER 5 OF 8 HCA COPYRIGHT 2006 ACS on STN
135:7790 Methods of preparing **electrochemical cells**.
Carlson, Steven A. (Moltech Corporation, USA). PCT Int. Appl. WO 2001039301 A2 **20010531**, 99 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32140 20001121. PRIORITY: US 1999-PV167149 19991123.

AB Provided are methods of prepg. an anode/separator assembly for use in **electrochem. cells** in which a microporous separator layer, such as a microporous xerogel layer, is coated on a temporary carrier substrate, and an anode active layer, such as lithium metal, is then deposited on the separator layer, prior to removing the temporary carrier substrate from the separator layer. One or more **protective coating layers** may be coated before or after the coating step of the microporous separator layer and prior to depositing the anode active layer. Addnl. layers, including an edge insulating layer, an anode current collector layer, an electrode insulating layer, and a cathode current collector layer, may be applied subsequent to the coating step of the microporous separator layer. Also, provide are methods of prepg. **electrochem. cells** utilizing anode/separator assemblies prepd. by such methods, and anode/separator assemblies and **electrochem. cells** prepd. by such methods.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(methods of prepg. **electrochem. cells**)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M004-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** anode separator assembly
IT **Conducting** polymers

(**coatings**; methods of prepg. **electrochem. cells**)

IT Primary **batteries**
Secondary **batteries**
(lithium; methods of prepg. **electrochem. cells**)

IT **Battery** anodes
**Battery** electrolytes
Coating materials
Polymer electrolytes
Primary **battery** separators
Secondary **battery** separators
Xerogels
(methods of prepg. **electrochem. cells**)

IT Chalcogenides
Polysulfides
(methods of prepg. **electrochem. cells**)

IT Polyesters, uses
(methods of prepg. **electrochem. cells**)

IT Porous materials
(microporous; methods of prepg. **electrochem. cells**)

IT Hydrocarbons, uses
(polymers; methods of prepg. **electrochem. cells**)

IT Polymers, uses
(sulfonated; methods of prepg. **electrochem. cells**)

IT 122525-99-9, zonyl fso-100
(colloidal; methods of prepg. **electrochem. cells**)

IT 110-71-4 646-06-0, 1,3-Dioxolane **7439-93-2**, Lithium, uses 7440-44-0D, Carbon, Li-intercalated, uses **7704-34-9**, Sulfur, uses 12798-95-7 14283-07-9, Lithium tetrafluoroborate 39448-96-9, Graphite lithium 53680-59-4 115672-18-9, Lithium sulfide (Li2(S8))
(methods of prepg. **electrochem. cells**)

IT 32535-84-5, Ammonium zirconyl carbonate
(methods of prepg. **electrochem. cells**)

IT 1314-23-4, Zirconium oxide, uses 1318-23-6, Pseudoboehmite 1332-29-2, Tin oxide 1344-28-1, Aluminum oxide, uses 2695-37-6, Sodium styrene-4-sulfonate 7440-50-8, Copper, uses 7631-86-9, Silicon oxide, uses 9002-89-5, airvol 125 9003-53-6D, Polystyrene, sulfonated 13463-67-7, Titanium oxide, uses 25038-59-9, Polyethylene terephthalate, uses 50856-26-3, Polyethylene glycol divinyl ether
(methods of prepg. **electrochem. cells**)

L20 ANSWER 6 OF 8 HCA COPYRIGHT 2006 ACS on STN
135:7784 Methods of preparing a cathode/separator assembly for use in **electrochemical cells**. Carlson, Steven A. (Moltech Corporation, USA). PCT Int. Appl. WO 2001039293 A2 **20010531**, 100 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32231 20001121. PRIORITY: US 1999-PV167150 19991123.

AB Provided are methods of prepg. a cathode/separator assembly for use in **electrochem. cells** in which a **protective coating layer**, such as a single ion **conducting layer**, is **coated** on a temporary carrier substrate, a microporous separator layer is then **coated** on the **protective coating layer**, and a cathode active layer is then coated on the separator layer, prior to removing the temporary carrier substrate from the **protective coating layer**. Addnl. layers, including an edge insulating layer, a cathode current collector layer, an electrode insulating layer, an anode current collector layer, an anode layer such as a lithium metal layer, and an anode **protective layer**, such as a single ion **conducting layer**, may be applied subsequent to the coating step of the microporous separator layer. Also, provided are methods of prepg. **electrochem. cells** utilizing cathode/separator assemblies prepd. by such methods, and cathode/separator assemblies and **electrochem. cells** prepd. by such methods.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M002-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery** cathode separator assembly
IT **Conducting** polymers
(**coatings**; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Chalcogenides
(metal; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT **Battery** anodes
**Battery** cathodes
**Battery** electrolytes
Polymer electrolytes
Primary **batteries**
Secondary **battery** separators
Xerogels
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Polysulfides
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Metals, uses
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Polyesters, uses
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Hydrocarbons, uses
(polymers, coatings; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Coating materials
(polymers; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Paper
(substrate; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Polymers, uses
(substrate; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT Polymers, uses
(sulfonated, coatings; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT 87340-85-0
(coatings; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)
IT 110-71-4 646-06-0, 1,3-Dioxolane **7439-93-2**, Lithium, uses 7440-44-0D, Carbon, lithium intercalated, uses

**7704-34-9**, Sulfur, uses 12798-95-7 14283-07-9, Lithium tetrafluoroborate 39448-96-9, Graphite lithium 53680-59-4 115672-18-9, Lithium sulfide (Li2(S8))
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)

IT 25086-89-9, Vinyl acetate-vinyl pyrrolidone copolymer
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)

IT 1314-23-4, Zirconium oxide, uses 1318-23-6, Pseudoboehmite 1332-29-2, Tin oxide 1344-28-1, Alumina, uses 2695-37-6, Sodium styrene-4-sulfonate 7631-86-9, Silica, uses 9002-89-5, Polyvinyl alcohol 9003-53-6D, Polystyrene, sulfonated 11114-17-3, Fluorad FC 430 13463-67-7, Titanium oxide, uses 25038-59-9, Polyethylene terephthalate, uses 50856-26-3, Polyethylene glycol divinyl ether 122525-99-9, Zonyl FSO-100
(methods of prepg. cathode/separator assembly for use in **electrochem. cells**)

IT 32535-84-5, Ammonium zirconyl carbonate
(precursor; methods of prepg. cathode/separator assembly for use in **electrochem. cells**)

L20 ANSWER 7 OF 8 HCA COPYRIGHT 2006 ACS on STN
133:32696 **Protective coating** for **battery** separators with microporous pseudo-boehmite layer. Ying, Qicong; Carlson, Steven A.; Skotheim, Terje A. (Moltech Corporation, USA). PCT Int. Appl. WO 2000036671 A1 **20000622**, 76 pp.
DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US30214 19991216. PRIORITY: US 1998-215029 19981217; US 1999-399967 19990921; US 1999-447901 19991123.

AB This invention pertains to separators for use in **electrochem. cells** which comprise at least one microporous pseudo-boehmite layer, which separator is in contact with at least one **protective coating layer** positioned on the anode-facing side of the separator opposite from the cathode active layer in the **cell; electrolyte** elements comprising such separators; elec. current producing cells comprising such separators; and methods of making such separators, **electrolyte** elements and **cells**.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M002-16
ICS H01M010-40; B01D071-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 57
ST **battery** separator microporous pseudoboehmite **layer** polymer **protective coating**
IT Polyesters, uses
(acrylates; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Sulfide glasses
(germanium lithium sulfide; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Styrene-butadiene rubber, uses
(hydrogenated, block, triblock; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Sulfide glasses
(lithium phosphorus sulfide; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Polyurethanes, uses
(polyoxyalkylene-, acrylic; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT **Battery** anodes
**Coating** process
**Conducting** polymers
Electric **conductors**, glass
Secondary **batteries**
Secondary **battery** separators
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT ABS rubber
Nitrile rubber, uses

Polyacenes
Polyacetylenes, uses
Polyolefins
Polyurethanes, uses
Styrene-butadiene rubber, uses
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 9003-56-9
(abs rubber, **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 10377-52-3, **Lithium** phosphate 12627-14-4, **Lithium** silicate 12676-27-6 37220-89-6, **Lithium** aluminate 39302-37-9, **Lithium** titanium oxide 152747-89-2, LAnthanum **lithium** oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, **Lithium** silicide sulfide 236388-74-2, **Lithium** boride sulfide 236388-75-3, Aluminum **lithium** sulfide
(**ion-conducting** glass; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 9003-18-3
(nitrile rubber, **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 7631-86-9, Silica, uses
(pigment; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 110-71-4 646-06-0, 1,3-Dioxolane **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses 63957-70-0, Pseudoboehmite 90076-65-6
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 9003-19-4, Polyvinyl ether 9003-39-8, Polyvinyl pyrrolidone 9003-63-8, Polybutyl methacrylate 25067-58-7, Polyacetylene 25190-62-9, Poly(p-phenylene) 28774-98-3, Poly(naphthalene-2,6-diyl) 64401-02-1D, polymer withurethane acrylate 82451-56-7, Polyazulene 96638-49-2, Poly(phenylenevinylene) 114239-80-4, Poly(perinaphthalene)
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 106107-54-4 694491-73-1
(styrene-butadiene rubber, hydrogenated, block, triblock; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 9003-55-8
(styrene-butadiene rubber, **protective coating**

for **battery** separators with microporous pseudo-boehmite layer)

L20 ANSWER 8 OF 8 HCA COPYRIGHT 2006 ACS on STN
131:146969 Plating metal anodes under **protective coatings** for use in **batteries**. Chu, May-Ming; Visco, Steven J.; De Jonghe, Lutgard C. (Polyplus Battery Company, Inc., USA). PCT Int. Appl. WO 9943034 A1 **19990826**, 40 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US3335 19990217. PRIORITY: US 1998-PV75017 19980218; US 1998-139603 19980825.

AB A method for forming lithium electrodes having **protective layers** involves plating lithium between a **lithium ion conductive protective layer** and a current collector of an electrode precursor. The electrode precursor is formed by depositing the **protective layer** on a very smooth surface of a current collector. The **protective layer** is a glass such as lithium phosphorus oxynitride and the current collector is a **conductive sheet** such as a copper sheet. During plating, **lithium ions** move through the **protective layer** and a lithium metal layer plates onto the surface of the current collector. The resulting structure is a protected lithium electrode. To facilitate uniform lithium plating, the electrode precursor may include a wetting layer which coats the current collector.

IT **7704-34-9**, Sulfur, uses
(plating metal anodes under **protective coatings** for use in **batteries**)
RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **7439-93-2**, Lithium, uses
(plating metal anodes under **protective coatings** for use in **batteries**)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

IC ICM H01M004-04
ICS H01M004-12; H01M010-36; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** lithium anode plating; coating lithium phosphorus oxynitride **battery** anode
IT Primary **batteries**
Secondary **batteries**
(lithium; plating metal anodes under **protective coatings** for use in **batteries**)
IT Plastics, uses
(metalized, current collector; plating metal anodes under **protective coatings** for use in **batteries**)
IT **Battery** anodes
(plating metal anodes under **protective coatings** for use in **batteries**)
IT Glass, uses
(plating metal anodes under **protective coatings** for use in **batteries**)
IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-44-0, Carbon, uses 11126-12-8, Iron sulfide 12673-92-6, Titanium sulfide
(anode precursor, wetting layer material; plating metal anodes under **protective coatings** for use in **batteries**)
IT 7440-02-0, Nickel, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses 12597-68-1, Stainless steel, uses
(current collector; plating metal anodes under **protective coatings** for use in **batteries**)
IT 1313-99-1, Nickel oxide (NiO), uses 7446-09-5, Sulfur dioxide, uses 7553-56-2, Iodine, uses **7704-34-9**, Sulfur, uses 7719-09-7, Thionyl chloride 11099-11-9, Vanadium oxide 11104-61-3, Cobalt oxide 11129-60-5, Manganese oxide 12068-85-8, Iron sulfide fes2 12162-79-7, Lithium manganese oxide limno2 25233-30-1, Polyaniline 51311-17-2, Carbon fluoride
(plating metal anodes under **protective coatings** for use in **batteries**)
IT **7439-93-2**, Lithium, uses
(plating metal anodes under **protective coatings** for use in **batteries**)
IT 74432-42-1, Lithium polysulfide 236388-74-2, Lithium boride sulfide 236388-76-4, Lithium phosphide sulfide
(plating metal anodes under **protective coatings** for use in **batteries**)

IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-75-3, Aluminum lithium sulfide
(**protective layer**; plating metal anodes under **protective coatings** for use in **batteries**)

=> D L21 1-8 CBIB ABS HITSTR HITIND

L21 ANSWER 1 OF 8 HCA COPYRIGHT 2006 ACS on STN
140:256345 Fabrication of cathode active material of a **lithium -sulfur battery**. Choi, Soo-Seok; Choi, Yun-Suk; Han, Ji-Seong; Park, Seung-Hee; Jung, Yong-Ju; Lee, Il-Young (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004058246 A1 20040325, 25 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-405237 20030403. PRIORITY: KR 2002-57576 20020923.

AB A pos. active material of a **lithium-sulfur battery** includes a sulfur-conductive agent-agglomerated complex in which a conductive agent particle is attached onto a surface of a sulfur particle having an av. particle size less than or equal to 7 μm. The sulfur-conductive agent-agglomerated complex is manufd. by mixing a sulfur powder and a conductive agent powder to form a mixt., and milling the mixt.

IC ICM H01M004-62
ICS H01M004-58
INCL 429232000; 429218100; 252182100; 429217000; 429231950
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST cathode active material **lithium sulfur battery**
IT Polyoxyalkylenes, uses
(alkylated; fabrication of cathode active material of **lithium-sulfur battery**)
IT Cork
Pitch
(carbon precursor; fabrication of cathode active material of **lithium-sulfur battery**)
IT Nanotubes
(carbon; fabrication of cathode active material of **lithium-sulfur battery**)
IT Telephones
(cellular; fabrication of cathode active material of **lithium-sulfur battery**)
IT Clocks
(digital; fabrication of cathode active material of **lithium-sulfur battery**)

IT Toys
(electronic; fabrication of cathode active material of **lithium-sulfur battery**)
IT **Battery** cathodes
(fabrication of cathode active material of **lithium-sulfur battery**)
IT Carbon black, uses
Carbon fibers, uses
Fluoropolymers, uses
Group IIIA elements
Group IVA elements
Polymer blends
Polyoxyalkylenes, uses
Transition metals, uses
(fabrication of cathode active material of **lithium-sulfur battery**)
IT Secondary **batteries**
(lithium; fabrication of cathode active material of **lithium-sulfur battery**)
IT Computers
Television
(portable; fabrication of cathode active material of **lithium-sulfur battery**)
IT Metals, uses
(powder; fabrication of cathode active material of **lithium-sulfur battery**)
IT Polyacetylenes, uses
Polyanilines
(**protective layer**; fabrication of cathode active material of **lithium-sulfur battery**)
IT Acoustic devices
(radios, two-way; fabrication of cathode active material of **lithium-sulfur battery**)
IT Lithium alloy, base
(fabrication of cathode active material of **lithium-sulfur battery**)
IT 7439-93-2, Lithium, uses 7704-34-9, Sulfur, uses 11102-77-5 12798-95-7 18282-10-5, Tin dioxide 22465-17-4, Titanium nitrate 51398-14-2 51401-38-8 51401-52-6 51401-53-7 53680-59-4 58504-18-0 70246-24-1 77194-67-3 77194-68-4 77194-69-5 97686-54-9
(fabrication of cathode active material of **lithium-sulfur battery**)
IT 7439-88-5, Iridium, uses 7439-92-1, Lead, uses 7439-97-6, Mercury, uses 7439-98-7, Molybdenum, uses 7440-03-1, Niobium, uses 7440-04-2, Osmium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-15-5, Rhenium, uses 7440-16-6,

Rhodium, uses 7440-18-8, Ruthenium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-25-7, Tantalum, uses 7440-26-8, Technetium, uses 7440-31-5, Tin, uses 7440-33-7, Tungsten, uses 7440-43-9, Cadmium, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7440-65-5, Yttrium, uses 7440-67-7, Zirconium, uses 7704-34-9D, Sulfur, compd. 7782-42-5, Graphite, uses 9002-84-0, Ptfe 9002-86-2, Polyvinyl chloride 9002-89-5, Polyvinyl alcohol 9003-19-4, Polyvinyl ether 9003-20-7, Polyvinyl acetate 9003-32-1, Polyethyl acrylate 9003-39-8, Polyvinyl pyrrolidone 9003-47-8, Polyvinylpyridine 9003-53-6, Polystyrene 9011-14-7, Pmma 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 13463-67-7, Titanium oxide, uses 15578-32-2, Stannous phosphate 24937-79-9, Pvdf 25014-41-9, Polyacrylonitrile 25322-68-3, Peo 25322-68-3D, Peo, alkylated 58799-80-7, Cobalt lanthanum strontium oxide colasro3 141067-82-5, Lanthanum manganese strontium oxide lamnsro3
(fabrication of cathode active material of **lithium-sulfur battery**)

IT 7440-44-0, Carbon, uses
(nanotubes; fabrication of cathode active material of **lithium-sulfur battery**)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7440-02-0, Nickel, uses 7440-20-2, Scandium, uses 7440-32-6, Titanium, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses
(powder; fabrication of cathode active material of **lithium-sulfur battery**)

IT 7439-95-4, Magnesium, uses 7440-42-8, Boron, uses 7440-55-3, Gallium, uses 7440-70-2, Calcium, uses 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 25067-58-7, Polyacetylene 25190-62-9, Poly(p-phenylene) 25233-30-1, Polyaniline 25233-34-5, Polythiophene 26009-24-5, Poly(p-phenylene vinylene) 28774-98-3, Poly(naphthalene-2,6-diyl) 30604-81-0, Polypyrrole 114239-80-4, Poly(perinaphthalene) 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 355408-23-0, Lithium nitride phosphide
(**protective layer**; fabrication of cathode active material of **lithium-sulfur battery**)

L21 ANSWER 2 OF 8 HCA COPYRIGHT 2006 ACS on STN
140:256340 Anodes for lithium **battery**. Kim, Yong-tae; Choi, Su-suk; Choi, Yun-suk; Lee, Kyoung-hee (Samsung Sdi Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004058232 A1 20040325, 10 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-664157 20030917. PRIORITY: KR 2002-57577 20020923.

AB A lithium neg. electrode for a lithium **battery** has good cycle life and capacity characteristics. The lithium neg. electrode comprises a lithium metal **layer** and a **protective layer** present on the lithium metal **layer**, where the **protective layer** includes an organosulfur compd. An organosulfur compd. having a thiol terminal group is preferred since such a compd. can form a complex with lithium metal to enable coating to be carried out easily. The organosulfur compd. has a large no. of S or N elements having high electronegativity to form a complex with lithium ions, so it renders lithium ions to be deposited relatively evenly on the lithium metal surface, reducing dendrite formation.

IC ICM H01M002-16
ICS H01M004-66; H01M004-40

INCL 429137000; 429246000; 429245000; 429212000; 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST anode lithium **battery**

IT Chalcogenides
Oxides (inorganic), uses
(Li-contg.; anodes for lithium **battery**)

IT Peroxides, uses
(acyl; anodes for lithium **battery**)

IT Hydroperoxides
(alkyl, tertiary; anodes for lithium **battery**)

IT Peroxides, uses
(alkyl; anodes for lithium **battery**)

IT **Battery** anodes
Coating materials
Conducting polymers
(anodes for lithium **battery**)

IT Acrylic polymers, uses
Polyanilines
Polyoxyalkylenes, uses
(anodes for lithium **battery**)

IT Amino acids, uses
Halogens
Lewis acids
Rare earth chlorides
Sulfonic acids, uses
Transition metal compounds
(dopant; anodes for lithium **battery**)

IT Primary **batteries**
Secondary **batteries**
(lithium; anodes for lithium **battery**)

IT Esters, uses
Ketals
(peroxy; anodes for lithium **battery**)

IT Crown ethers
Polybenzimidazoles
Polyquinolines
Polyquinoxalines
(thiophenes, polymers; anodes for lithium **battery**)

IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, 1,3-Dioxolane 7439-93-2, Lithium, uses 7704-34-9, **Sulfur**, uses
(anodes for **lithium battery**)

IT 67-63-0, Isopropyl alcohol, uses 75-91-2, tert-Butyl hydroperoxide 78-63-7, 2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane 78-67-1, Azobisisobutyronitrile 80-15-9, Cumene hydroperoxide 80-43-3, Dicumyl peroxide 94-36-0, Dibenzoyl peroxide, uses 105-74-8, Dilauroyl peroxide 110-05-4, Di-tert-butyl peroxide 123-23-9, Succinic acid peroxide 762-12-9, Didecanoyl peroxide 927-07-1, tert-Butylperoxypivalate 2167-23-9, 2,2-Di-(tert-butylperoxy)butane 3025-88-5, 2.5-Dihydroperoxy-2,5-dimethylhexane 4511-39-1, tert-Amylperoxybenzoate 15667-10-4, 1,1-Di-(tert-amylperoxy)cyclohexane 16066-38-9, Di(n-propyl)peroxy dicarbonate 16111-62-9, Di(2-ethylhexyl)peroxy dicarbonate 19910-65-7, Di(sec-butyl)peroxy dicarbonate 24937-05-1, Poly(ethyleneadipate) 24938-43-0, Poly(β-propiolactone) 24969-06-0, Polyepichlorohydrin 25190-62-9, Poly(p-phenylene) 25233-30-1, Polyaniline 25233-30-1D, Polyaniline, sulfonated 25233-34-5, Polythiophene 25233-34-5D, Polythiophene, derivs. 25322-68-3, Peo 25322-69-4, Polypropylene oxide 25667-11-2, Poly(ethylenesuccinate) 25721-76-0, Polyethylene glycol dimethacrylate 25852-49-7, Polypropylene glycol dimethacrylate 26570-48-9, Poly(ethylene glycol diacrylate) 26748-47-0, α-Cumylperoxyneodecanoate 34099-48-4, Peroxydicarbonate 52496-08-9, Poly(propyleneglycoldiacrylate) 55794-20-2, Ethyl 3,3-di-(tert-butylperoxy)butyrate 95732-35-7 97332-10-0, Poly(N-propylaziridine) 139096-57-4, Isoquinoline homopolymer 172973-34-1
(anodes for lithium **battery**)

IT 865-44-1, Iodine trichloride 1493-13-6, Triflic acid 7446-11-9, Sulfur trioxide, uses 7550-45-0, Titanium chloride (TiCl4) (T-4)-, uses 7553-56-2, Iodine, uses 7601-90-3, Perchloric acid, uses 7637-07-2, uses 7647-01-0, Hydrochloric acid, uses 7647-19-0, Phosphorus pentafluoride 7664-39-3, Hydrofluoric acid, uses 7664-93-9, Sulfuric acid, uses 7697-37-2, Nitric acid, uses 7705-08-0, Ferric chloride, uses 7721-01-9, Tantalum chloride (TaCl5) 7726-95-6, Bromine, uses 7782-44-7, Oxygen, uses 7782-50-5, Chlorine, uses 7783-68-8, Niobium fluoride nbf5 7783-70-2, Antimony pentafluoride 7783-81-5 7783-82-6 7783-93-9, Silver perchlorate 7784-36-3, Arsenic pentafluoride 7789-21-1, Fluorosulfonic acid 7789-33-5, Iodine monobromide 7790-94-5, Chlorosulfonic acid 7790-99-0, Iodine monochloride

10026-11-6 10026-12-7, Niobium chloride (NbCl5) 10277-43-7, Lanthanum nitrate hexahydrate 10294-33-4, Boron tribromide 10294-34-5 13283-01-7 13499-05-3 13709-32-5, Bis(fluorosulfonyl)peroxide 13774-85-1 13819-84-6, Molybdenum fluoride mof5 13870-10-5, Iron chloride oxide feocl 13873-84-2, Iodine monofluoride 14635-75-7, Nitrosyl tetrafluoroborate 14797-73-0, Perchlorate 14874-70-5, Tetrafluoroborate 16871-80-0, Nitrosyl hexachloroantimonate 16887-00-6, Chloride, uses 16919-18-9, Hexafluorophosphate 16941-92-7, Hexachloroiridic acid 16973-45-8, Hexafluoroarsenate 17111-95-4 17856-92-7 20461-54-5, Iodide, uses 24959-67-9, Bromide, uses 25321-43-1, Octylbenzenesulfonic acid 27176-87-0, Dodecylbenzene sulfonic acid
(dopant; anodes for lithium **battery**)

IT 540-63-6, 1,2-Ethanedithiol 1072-71-5, 2,5-Dimercapto-1,3,4-thiadiazole 2001-93-6, 2,4-Dimercaptopyrimidine 2150-02-9, Bis(2-mercaptoethyl)ether 3570-55-6, Bis(2-mercaptoethyl)sulfide 9002-98-6 9002-98-6D, derivs. 37306-44-8D, Triazole, mecapto derivs 131538-50-6 135886-78-1 135886-79-2
(**protective coating**; anodes for lithium **battery**)

IT 7704-34-9D, Sulfur, organosulfur compd.
(**protective layer**; anodes for lithium **battery**)

IT 273-77-8, 1,2,3-Benzothiadiazole 612-79-3, 6,6'-Biquinoline 25013-01-8, Polypyridine 25013-01-8D, Polypyridine, derivs. 26856-35-9, Dihydrophenanthrene 27986-50-1, Poly(1,3-cyclohexadiene) 30604-81-0, Polypyrrole 30604-81-0D, Polypyrrole, derivs. 51937-67-8, Polyferrocene 71730-08-0, Polyanthraquinone 136902-52-8, 2,2'-Bipyridine homopolymer 136902-52-8D, 2,2'-Bipyridine homopolymer, derivs. 190201-51-5, Pyrimidine homopolymer 190201-57-1, 1,5-Naphthyridine homopolymer
(thiophenes, polymers; anodes for lithium **battery**)

L21 ANSWER 3 OF 8 HCA COPYRIGHT 2006 ACS on STN

140:149223 Method for producing cathode for **lithium-sulfur battery**. Hwang, Duck-chul; Park, Zin; Lee, Jae-woan (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004029014 A1 20040212, 11 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-634748 20030806. PRIORITY: KR 2002-46581 20020807.

AB The invention concerns a pos. electrode of a **lithium-sulfur battery**, a method of producing the same, and a **lithium-sulfur battery** include, as the pos. electrode, a current collector, a pos. active material layer on the current collector, and a polymer layer on the pos. active material on the current collector.

IC ICM H01M002-16

ICS H01M004-60; H01M004-58
INCL 429246000; 429251000; 429252000; 429218100; 429213000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST cathode **lithium sulfur battery**
IT Polyurethanes, uses
(acrylates, ethoxylated; method for producing cathode for **lithium-sulfur battery**)
IT Styrene-butadiene rubber, uses
(hydrogenated, block, triblock, sulfonated; method for producing cathode for **lithium-sulfur battery**)
IT Primary **batteries**
(lithium; method for producing cathode for **lithium-sulfur battery**)
IT **Battery** cathodes
(method for producing cathode for **lithium-sulfur battery**)
IT ABS rubber
Fluoropolymers, uses
Nitrile rubber, uses
Polyolefins
Polyoxyalkylenes, uses
Polyvinyl butyrals
Styrene-butadiene rubber, uses
(method for producing cathode for **lithium-sulfur battery**)
IT Lithium alloy, base
(method for producing cathode for **lithium-sulfur battery**)
IT 9003-56-9
(ABS rubber, method for producing cathode for **lithium-sulfur battery**)
IT 1344-28-1, Alumina, uses 7631-86-9, Colloidal silica, uses
(colloidal; method for producing cathode for **lithium-sulfur battery**)
IT 10344-93-1D, Acrylate, alkyl deriv.
(ethoxylated; method for producing cathode for **lithium-sulfur battery**)
IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, 1,3-Dioxolane 1314-23-4, Zirconium oxide, uses 1332-29-2, Tin oxide 1332-37-2, Iron oxide, uses 7439-93-2, Lithium, uses 7440-44-0, Carbon, uses 7704-34-9, Sulfur, uses 7704-34-9D, Sulfur, org. compd. 7791-03-9, Lithium perchlorate 9002-89-5, Polyvinyl alcohol 9003-19-4, Polyvinyl ether 9003-20-7, Polyvinyl acetate 9003-22-9, Vinyl acetate-vinyl chloride copolymer 9003-39-8, Polyvinylpyrrolidone 9004-35-7, Cellulose acetate 9010-88-2, Ethyl acrylate-methylmethacrylate copolymer 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer

11075-35-7, Vanadium titanium oxide 11099-11-9, Vanadium oxide 11126-12-8, Iron sulfide 12673-92-6, Titanium sulfide 12789-64-9, Iron titanate 13463-67-7, Titanium oxide, uses 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 24937-79-9, PVDF 25014-41-9, Polyacrylonitrile 25086-89-9, Vinyl acetate-vinylpyrrolidone copolymer 25322-68-3, Peo 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 49717-87-5, 2-Propenoic acid, ion(1-) homopolymer, uses 49717-97-7, 2-Propenoic acid, 2-methyl-, ion(1-) homopolymer, uses 69822-67-9, Poly(carbon sulfide) 90076-65-6, Lithium bis(trifluoromethylsulfonyl)imide
(method for producing cathode for **lithium-sulfur battery**)

IT 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses 7440-24-6, Strontium, uses 7440-28-0, Thallium, uses 7440-36-0, Antimony, uses 7440-38-2, Arsenic, uses 7440-56-4, Germanium, uses 7440-69-9, Bismuth, uses 7440-70-2, Calcium, uses 7440-74-6, Indium, uses 7553-56-2, Iodine, uses 7726-95-6, Bromine, uses
(method for producing cathode for **lithium-sulfur battery**)

IT 9003-18-3
(nitrile rubber, method for producing cathode for **lithium-sulfur battery**)

IT 64401-02-1 84170-28-5
(**protective coating** contg.; method for producing cathode for **lithium-sulfur battery**)

IT 7429-90-5, Aluminum, uses 7440-39-3, Barium, uses 7440-42-8, Boron, uses 7723-14-0, Phosphorus, uses 7727-37-9, Nitrogen, uses 7782-41-4, Fluorine, uses 7782-44-7, Oxygen, uses 7782-50-5, Chlorine, uses 26570-48-9, Polyethylene glycol diacrylate 52496-08-9, Polypropylene glycol diacrylate
(**protective coating**; method for producing cathode for **lithium-sulfur battery**)

IT 106107-54-4
(styrene-butadiene rubber, hydrogenated, block, triblock, sulfonated; method for producing cathode for **lithium-sulfur battery**)

IT 9003-55-8
(styrene-butadiene rubber, method for producing cathode for **lithium-sulfur battery**)

IT 694491-73-1D, hydrogenated, block, triblock
(styrene-butadiene rubber, sulfonated; method for producing cathode for **lithium-sulfur battery**)

L21 ANSWER 4 OF 8 HCA COPYRIGHT 2006 ACS on STN
140:29502 Nonaqueous electrolyte **batteries** with high energy density and charge-discharge efficiency. Fujimoto, Yuki; Nakagawa,

Hiroe; Nukuta, Toshiyuki (Yuasa Corporation, Japan). Jpn. Kokai Tokkyo Koho JP 2003346899 A2 20031205, 13 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-156599 20020530.

AB The **batteries**, useful for secondary **lithium batteries**, contain **S**- and/or N-contg. fluoroalkyl compds. (e.g., F-contg. sulfonate esters, sulfate esters, amides) in nonaq. electrolytes. The org. compds. prevent degrdn. of propylene carbonate by forming Li ion-permeable **protective films** on anodes at first charging.

IC ICM H01M010-40
ICS H01M004-02; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST nonaq electrolyte lithium **battery** fluoroalkyl sulfonate ester; sulfate ester fluoroalkyl nonaq electrolyte lithium **battery**; amide fluoroalkyl nonaq electrolyte lithium **battery**; propylene carbonate degrdn prevention **battery** electrolyte

IT Amides, uses
(F-substituted, electrolyte component; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT Sulfates, uses
(F-substituted, esters, electrolyte components; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT Carbonates, uses
(cyclic, electrolyte; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT Sulfonic acids, uses
(esters, F-substituted, electrolyte components; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT Secondary **batteries**
(lithium; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT **Battery** electrolytes
(nonaq.; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT 7782-42-5, Graphite, uses
(anodes; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT 425-75-2, Ethyl trifluoromethanesulfonate 665-97-4 1547-87-1
632286-63-6 632286-64-7 632323-67-2
(electrolyte component; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate
4437-85-8, Butylene carbonate
(electrolyte; nonaq. electrolyte **batteries** contg. S- and/or N-contg. fluoroalkyl compds. in electrolytes showing high energy d. and charge-discharge efficiency)

L21 ANSWER 5 OF 8 HCA COPYRIGHT 2006 ACS on STN
131:312496 Encapsulated lithium electrodes having glass **protective layers** and method for their preparation. Visco, Steve J.; Tsang, Floris Y. (Polyplus Battery Company, Inc., USA). PCT Int. Appl. WO 9957770 A1 **19991111**, 33 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US6895 19990329. PRIORITY: US 1998-83947 19980501; US 1998-139601 19980825.

AB A method for fabricating an active metal electrode involves depositing lithium or other active metal electrode on a **protective layer**. The **protective layer** is a glassy or amorphous material that conducts ions of the active metal. It may be deposited on a releasable web carrier or other substrate such as polymer electrolyte layer. Lithium is then deposited on the **protective layer**. Finally, a current collector is attached to the lithium.

IC ICM H01M004-02
ICS H01M004-04; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **lithium sulfur battery** anode encapsulation

IT Secondary **batteries**
(**Li-S**; encapsulated **lithium** electrodes having glass **protective layers** and method for their prepn.)

IT **Battery** anodes
Encapsulation
Polymer electrolytes
(encapsulated lithium electrodes having glass **protective**

**layers** and method for their prepn.)

IT Polyethers, uses
Polymers, uses
Polyphosphazenes
Polythioethers
(gel electrolyte contg.; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT Polyoxyalkylenes, uses
(gel or solid electrolyte contg.; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT **Battery** electrolytes
(gel; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT Imines
(polyimines, gel electrolyte contg.; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT 7440-02-0, Nickel, uses 12597-68-1, Stainless steel, uses
(current collector; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT 7439-93-2, Lithium, uses
(encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum Lithium sulfide 236388-76-4, Lithium phosphide sulfide
(**protective layer** contg.; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses
(releasable web carrier; encapsulated lithium electrodes having glass **protective layers** and method for their prepn.)

L21 ANSWER 6 OF 8 HCA COPYRIGHT 2006 ACS on STN
119:184711 **Lithium/sulfur** dioxide cells and **lithium**/thionyl chloride cells - safe use and testing. Wagner, Clifford G. (Neutron Devices, GE, Largo, FL, 34649-2908, USA). Proceedings of the International Power Sources Symposium, 35th, 125-8 (English) **1992**. CODEN: PIPSEG.

AB Most Li/SiO2 cells and Li/SOCl2 cells have pressure-relief safety devices called vents built into them. These vents are designed to open under conditions of increasing internal cell pressure. The

likelihood of cell venting has been reduced to very low levels by optimizing cell designs. If fully developed Li/SO2 cells or Li/SOCl2 cells (or **batteries**) are discharged within the intended design limits, they are essentially nonhazardous. The consequences of cell venting are being minimized by use of appropriate absorbents and **protective coatings**. During **battery** assembly and test, detection and monitoring equipment is used to sense the presence of vented gases. Tester data anal. techniques were developed to foresee either an increasing likelihood of a vent or the presence of a vented cell. Std. cleanup procedures were developed to safely decontaminate the assembly or test area following a cell vent.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST safety lithium **battery**; **sulfur** dioxide **lithium battery** safety; thionyl chloride lithium **battery** safety

IT **Batteries**, primary
(**lithium-sulfur** dioxide and **lithium**-thionyl chloride, safe use and testing of)

IT Safety
(of **lithium-sulfur** dioxide and **lithium**-thionyl chloride **batteries**)

L21 ANSWER 7 OF 8 HCA COPYRIGHT 2006 ACS on STN

106:130911 The analysis of lithium anode surface films in the **lithium-sulfur** dioxide cell using diffuse reflectance Fourier transform infrared spectroscopy. Anderson, Mark (Jet Propul. Lab., Pasadena, CA, 91109, USA). Spectroscopy (Duluth, MN, United States), 2(2), 54, 56, 58 (English) **1987**. CODEN: SPECET. ISSN: 0887-6703.

AB Diffuse reflectance Fourier transform IR spectroscopy has been used to improve the anal. of Li anode surface films in the Li/SO2 **battery**. This high-energy, light-wt. cell owes its stability to a **protective film** on Li metal. The film chem. influences properties, such as rechargeability, self-discharge, and safety. An IR technique is described for qual. anal. of the cell that is safe, sensitive, and requires no alteration of the anode surface. This technique should have general research applications on **electrochem. cells** with reactive metal electrodes that are mediated by surface films.

CC 79-6 (Inorganic Analytical Chemistry)
Section cross-reference(s): 52

ST lithium anode surface film analysis; **battery** lithium anode surface analysis; IR lithium anode surface analysis; diffuse reflectance Fourier IR analysis; safety **electrochem cell** analysis

IT Anodes
(lithium, anal. of surface films of, in **lithium**-

**sulfur** dioxide cells, by diffuse-reflectance Fourier-transform IR spectroscopy)

IT **Batteries**, primary
(**lithium-sulfur** dioxide, anal. of **lithium** anode surface films in, by diffuse-reflectance Fourier-transform IR spectroscopy)

IT Surface analysis
(of **lithium** anodes, in **lithium-sulfur** dioxide cells, by diffuse-reflectance Fourier-transform IR spectroscopy)

IT 7439-93-2, Lithium, analysis
(anal. of anode surface films of, in **lithium-sulfur** dioxide cells, by diffuse-reflectance Fourier-transform IR spectroscopy)

IT 13453-87-7 15593-53-0 59744-77-3, Lithium dithionite
(detection of, on lithium anode surface films in **lithium-sulfur** dioxide cells, by diffused-reflectance Fourier-transform IR spectroscopy)

L21 ANSWER 8 OF 8 HCA COPYRIGHT 2006 ACS on STN

95:46029 Lithium-solvent interactions in lithium/thionyl chloride and **lithium/sulfur** dioxide **battery** systems.
Dey, A. N. (Lab. Phys. Sci., Duracell Int., Inc., Burlington, MA, 01803, USA). Proceedings - Electrochemical Society, 80-7(Proc. Workshop Lithium Nonaqueous Battery Electrochem.), 83-97 (English) **1980**. CODEN: PESODO. ISSN: 0161-6374.

AB The Li-solvent interactions in the Li/SOCl2 system leads to the formation of a **protective film** of LiCl on Li thereby passivating the anode from further chem. attack. This results in voltage-delay of the **batteries** during use. The study of the kinetics of the growth and the morphol. of the film led to significant improvements in the understanding of the film growth which in turn was useful in solving the voltage-delay problem. The Li-solvent interaction in the Li/SO2 org. electrolyte system was particularly important from a safety standpoint. The reactive species responsible for the unsafe behavior were identified, and approaches to replace those reactive species by less reactive ones and also to mitigate the reactivity by additives were developed. In general, the Li-solvent interactions play a very important role in detg. the performance and the safety of the Li **batteries**.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery** solvent reaction safety; **sulfur** dioxide **lithium battery** safety; thionyl chloride lithium **battery** safety

IT **Batteries**, primary
(**lithium-sulfur** dioxide and **lithium**-thionyl chloride, lithium-solvent interactions in)

IT Safety

(of **lithium-sulfur** dioxide and **lithium**-thionyl chloride **batteries**, lithium-solvent interactions in relation to)
IT Passivation
(electrochem., of **lithium**, in **sulfur** dioxide and thionyl chloride **battery** systems)
IT 7439-93-2, reactions
(reaction of, with solvent, in **battery** systems)

=> D L22 1-16 CBIB ABS HITSTR HITIND

L22 ANSWER 1 OF 16 HCA COPYRIGHT 2006 ACS on STN
142:180422 **Lithium-sulfur batteries.** Cho, Ji Hun; Jang, Deok Rye; Jun, Sang Eun; Kim, Hui Tak; Kim, Seon Uk; Ko, Gi Seok; Kwon, Chang Wi (Newturn Energy Co., Ltd., S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2003027395 A 20030407, No pp. given (Korean). CODEN: KRXXA7. APPLICATION: KR 2001-60582 20010928.
AB This **battery** has a C electrode to minimize loss of sol. polysulfide through reaction with a Li anode. The **Li-S battery** comprises at least one of unit cells comprising an electrode group which is formed by laminating a cathode contg. a collector and an anode consisting Li or Li alloy, and winding the laminate so as to expose the anode; a C electrode which consists of the collector **coated** with the **conductor** and is connected to the cathode; and an electrolyte which is positioned between the anode and the cathode, and between the anode and the C electrode, and contacts with the anode, the cathode, and the C electrode.
IC ICM H01M010-38
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **lithium sulfur battery** carbon electrode
IT **Battery** electrodes
(**lithium-sulfur batteries**)
IT Secondary **batteries**
(**lithium; lithium-sulfur batteries**)
IT **Lithium** alloy, base
(**lithium-sulfur batteries**)
IT 7439-93-2, **Lithium**, uses 7440-44-0, Carbon, uses
(**lithium-sulfur batteries**)

L22 ANSWER 2 OF 16 HCA COPYRIGHT 2006 ACS on STN
142:180403 Conductive material for positive electrode and **lithium-sulfur battery** using the conductive material. Cho, Ji Hun; Jang, Deok Rye; Jun, Sang Eun;

Kim, Hui Tak; Kim, Seon Uk; Ko, Gi Seok; Kwon, Chang Wi (Newturn Energy Co., Ltd., S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2003006746 A 20030123, No pp. given (Korean). CODEN: KRXXA7. APPLICATION: KR 2001-42635 20010714.

AB A conductive material for a pos. electrode and a **lithium-sulfur battery** using the conductive material are provided, to improve the lifetime of a **battery** by increasing the energy per wt. and per vol. of a **battery** and the adhesive strength between a pos. coating layer and a current collector. The conductive material comprises 100 parts by wt. of a conductive material mixt. consisting of 5-95% of carbon black and 5-95% of at least one selected from carbon nano-fiber, fibrous graphite and carbon nanotube; and 0.5-60 parts by wt. of graphite. Preferably the carbon black has a particle size <0.2 μm and a surface area <1,000 m2/g; the graphite is spherical, imperfect spherical or thin strip-shaped and has a particle size <50 μm and a surface area <200 m2/g; the carbon nano-fiber has a diam. <1.0 μm, a length <10 μm and a surface area <500 m2/g; and the fibrous graphite has a diam. <15 μm, a length <15 μm and a surface area of 50 m2/g. The **lithium-sulfur battery** comprises a pos. electrode which consists of the conductive material, an active material and a binder.

IC ICM H01M004-62

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

ST conductive material pos electrode **lithium sulfur battery** carbon graphite; carbon graphite nanotube nanofiber black sphere conductor **battery** electrode

IT Adhesion, physical
(between electrode coating and current collector; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)

IT Nanofibers
Nanotubes
(carbon; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)

IT **Battery** electrodes
Binders
(conductive material for pos. electrode and **lithium sulfur battery** using conductive material)

IT Carbon black, uses
(conductive material for pos. electrode and **lithium sulfur battery** using conductive material)

IT Electric conductors
(current collector and electrode **coating; conductive** material for pos. electrode and **lithium sulfur battery** using

conductive material)
IT Carbon fibers, uses
(graphite; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)
IT Secondary **batteries**
(lithium; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)
IT Particle size
Surface area
(of carbon and graphite; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)
IT 7439-93-2, Lithium, uses 7704-34-9, Sulfur, uses 7782-42-5, Graphite, uses
(conductive material for pos. electrode and **lithium sulfur battery** using conductive material)
IT 7440-44-0, Carbon, uses
(nanofibers, nanotubes; conductive material for pos. electrode and **lithium sulfur battery** using conductive material)

L22 ANSWER 3 OF 16 HCA COPYRIGHT 2006 ACS on STN
142:138256 **Lithium sulfur** secondary **battery**
. Choi, Su Seok; Choi, Yun Seok; Hwang, Deok Cheol; Jung, Yong Ju; Kim, Ju Seok; Lee, Je Wan; Noh, Hyeong Gon; Park, Jin (Samsung SDI Co., Ltd., S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2002018395 A **20020308**, No pp. given (Korean). CODEN: KRXXA7. APPLICATION: KR 2000-51684 20000901.
AB A **lithium sulfur** secondary **battery** is provided to improve the lifetime and the capacitance by enhancing the cond. of an anode plate by employing a polymer film coating the active material of an anode. The **lithium sulfur** secondary **battery** comprises an anode employing an active material selected from the group consisting of **sulfur**(S8), **lithium** sulfide and lithium polysulfide; a cathode employing a lithium metal or a lithium alloy; and a polymer film which is ion-conductive and elec. **conductive** and **coats** the cathode active material. Preferably the polymer film contains further carbon or metal powder and has a thickness of 20 μm or less. The polymer film is selected from the group consisting of polyvinylidene fluoride, a copolymer of polyvinylidene fluoride and hexafluoropropene, poly(Me methacrylate), poly(vinyl acetate), poly(vinyl butyral-co-vinyl alc.-co-vinyl acetate), poly(Me methacrylate-co-Et acrylate), polyacrylonitrile, poly(ethylene oxide), a copolymer of vinyl chloride and vinyl acetate, poly(vinyl alc.), poly(1-vinyl pyrrolidone-co-vinyl acetate), cellulose acetate

and poly(vinyl pyrrolidone).
IC ICM H01M004-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **lithium sulfur** secondary **battery**
IT **Conducting** polymers
(**coatings**, ionically and elec. conducting; **lithium sulfur** secondary **battery**)
IT Polyvinyl butyrals
(copolymers with vinyl alc. and vinyl acetate; **lithium sulfur** secondary **battery**)
IT **Battery** cathodes
Electric conductivity
(**lithium sulfur** secondary **battery**)
IT Fluoropolymers, uses
Polyoxyalkylenes, uses
(**lithium sulfur** secondary **battery**)
IT Secondary **batteries**
(**lithium**; **lithium sulfur** secondary **battery**)
IT **Battery** anodes
(polymer-encapsulated; **lithium sulfur** secondary **battery**)
IT Vinyl compounds, uses
(polymers, carbon or metal composites, film coating; **lithium sulfur** secondary **battery**)
IT 10544-50-0, **Sulfur** (S8), uses 12136-58-2, Lithium sulfide (Li2S) 74432-42-1, Lithium sulfide (Li2(Sx))
(anode; **lithium sulfur** secondary **battery**)
IT 9002-89-5, Polyvinyl alcohol 9003-20-7, Polyvinyl acetate 9003-22-9, Poly(vinyl acetate-vinyl chloride) 9003-39-8, Poly(vinylpyrrolidone) 9004-35-7 9010-88-2, Ethyl acrylate-methyl methacrylate copolymer 9011-14-7 9011-17-0 24937-79-9, Polyvinylidene fluoride 25014-41-9 25086-89-9 25322-68-3, Poly(ethylene oxide)
(carbon or metal composites, film coating; **lithium sulfur** secondary **battery**)
IT 7439-93-2, **Lithium**, uses 7439-93-2D, **Lithium**, alloys
(cathode; **lithium sulfur** secondary **battery**)

L22 ANSWER 4 OF 16 HCA COPYRIGHT 2006 ACS on STN
139:24151 Preparation of cathode for **lithium sulfur battery**. Choi, Jae-Young; Yoo, Duck-Young; Lee, Jong-Ki; Kim, Min-Seuk (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2003113627 A1 20030619, 12 pp. (English). CODEN: USXXCO.

APPLICATION: US 2002-259293 20020930. PRIORITY: KR 2001-80906 20011218.

AB Provided is a cathode including a current collector, and a cathode active material layer laminated on the current collector, a method of making the cathode, and a **battery** including the cathode. The cathode active material includes particles having a core-shell structure with a sulfur-contg. active material core, a **conductor coating** disposed on a surface of the active material core, and a binder coating disposed on the **conductor coating**. A high-performance **lithium sulfur battery** can be manufd. using the cathode, since sufficient bondability can be attained with only a small amt. of a binder.

IC ICM H01M004-58
ICS H01M004-62

INCL 429218100; 429232000; 429217000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST cathode prepn **lithium sulfur battery**

IT Fluoropolymers, uses
Polyoxyalkylenes, uses
Styrene-butadiene rubber, uses
(binder coating; prepn. of cathode for **lithium sulfur battery**)

IT **Battery** cathodes
Coating materials
(prepn. of cathode for **lithium sulfur battery**)

IT Polysulfides
(prepn. of cathode for **lithium sulfur battery**)

IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Polyvinylidene fluoride 25322-68-3, Peo
(binder coating; prepn. of cathode for **lithium sulfur battery**)

IT 7440-44-0, Carbon, uses
(coating; prepn. of cathode for **lithium sulfur battery**)

IT 9002-88-4, Polyethylene
(high d.; prepn. of cathode for **lithium sulfur battery**)

IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, Dioxolane 1314-23-4, Zirconium oxide (ZrO2), uses 7429-90-5, Aluminum, uses 7704-34-9, Sulfur, uses 21324-40-3, Lithium hexafluorophosphate 33454-82-9, Lithium triflate
(prepn. of cathode for **lithium sulfur battery**)

IT 75-05-8, Acetonitrile, uses 109-99-9, Thf, uses 872-50-4, n-Methyl-2-pyrrolidone, uses

(solvent; prepn. of cathode for **lithium sulfur battery**)
IT 9003-55-8
(styrene-butadiene rubber, binder coating; prepn. of cathode for **lithium sulfur battery**)

L22 ANSWER 5 OF 16 HCA COPYRIGHT 2006 ACS on STN
118:42281 Secondary lithium **batteries** for delivering high power pulses. Walker, Charles W., Jr. (United States of America as Represented by the Secretary of the Army, USA). Statutory Invent. Regist. US 1054 H1 **19920505**, 10 pp. (English). CODEN: SRXXEV. APPLICATION: US 1991-715265 19910614.
AB The **batteries** have poly(3-methylthiophene), PMT, cathode and electrolyte of Li(SO2)3AlCl4, 1M LiAlCl4-SOCl2, and 1M LiAlCl4-SO2Cl2. The PMT cathode is a thin electrochem. formed, elec. **conducting film**. These **batteries** delivered high power pulses for several s and min with volumetric power d. exceeding porous C cathode technol.
IC ICM H01M006-14
INCL 429194000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium polymethylthiopene **battery** nonaq electrolyte; thionyl chloride lithium polymethylthiophene **battery**; sulfuryl chloride lithium polymethylthiophene **battery**; **sulfur** dioxide **lithium** polymethylthiophene **battery**
IT **Batteries**, secondary
(lithium-poly(methylthiophene), delivering high power pulses)
IT 84928-92-7, Poly(3-methylthiophene)
(cathodes, for nonaq.-electrolyte lithium **batteries** delivering high power pulses)
IT 7719-09-7, Thionyl chloride 7791-25-5, Sulfuryl chloride 86263-71-0
(in lithium-poly(methylthiophene) **batteries** delivering high power pulses)

L22 ANSWER 6 OF 16 HCA COPYRIGHT 2006 ACS on STN
111:118135 An electrochemical investigation of the temperature dependence of inorganic electrolytes in rechargeable lithium **batteries**. Lee, T. J.; Fey, G. T. K.; Yao, P. C.; Chen, S. Y. (Dep. Chem. Eng., Natl. Cent. Univ., Ghungli, 32054, Taiwan). Journal of Power Sources, 26(3-4), 511-17 (English) **1989**. CODEN: JPSODZ. ISSN: 0378-7753.
AB The effect of temp. on the stability of LiAlCl4/SO2 and LiGaCl4/SO2 electrolytes was studied by cyclic voltammetry and cond. methods using a Pt electrode; the effect of temp. on the **cond.** of **films** on Li electrodes was studied by an a.c. impedance technique. LiGaCl4 had better cond. and was more stable than

LiAlCl4. For both electrolytes at <25°, the cond. increased with temp., but at >25°, the cond. decreased with increasing temp. The implication of a change in the ionic transport mechanism is discussed.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72, 76

ST lithium **battery** inorg electrolyte stability; chloroaluminate lithium electrolyte **battery**; chlorogallate lithium electrolyte **battery**; **sulfur** dioxide **lithium battery** electrolyte

IT **Batteries**, secondary
(**lithium-sulfur** dioxide, stability of **lithium** tetrachloroaluminate and lithium tetrachlorogallate in, temp. effect on)

IT Electric conductivity and conduction
(of lithium tetrachloroaluminate or **lithium** tetrachlorogallate in **sulfur** dioxide, in **lithium** secondary **batteries**)

IT Passivation
(electrochem., of lithium anodes, in lithium tetrachloroaluminate or **lithium** tetrachlorogallate electrolyte, in **sulfur** dioxide **battery**)

IT 7439-93-2, Lithium, uses and miscellaneous
(anodes, passivated, elec. cond. of, in lithium tetrachloroaluminate and **lithium** tetrachlorogallate electrolytes, in **sulfur** dioxide **battery**)

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous
(elec. cond. of lithium tetrachloroaluminate and lithium tetrachlorogallate electrolytes in, in lithium secondary **batteries**)

IT 14024-11-4, Lithium tetrachloroaluminate 15955-98-3, Lithium tetrachlorogallate
(electrolyte, stability of, in sulfur dioxide, temp. effect on, in lithium secondary **batteries**)

L22 ANSWER 7 OF 16 HCA COPYRIGHT 2006 ACS on STN
110:11086 Laminar **batteries**. Yoneyama, Sachiko; Osawa, Toshiyuki (Ricoh Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 63168964 A2 **19880712** Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1986-309465 19861229.

AB Laminar **batteries** having ≥1 electrode-active mass prepd. from a polymer sheet, is sealed inside packing sheets of a flexible material with the polymer sheet pressed by an external force applied via the packing sheets. A cassette-type **battery** is prepd. by inserting a laminar **battery** having ≥1 polymer electrode sheet into a holder and applying a pressure to the laminar **battery**. Thus, a 40-μm polypyrrole cathode **film** having a **cond.** of 45

**S**/cm, a **Li** anode film, a porous polypropylene separator, and Ni collector foils were hot sealed in polypropylene packing sheets, and a 1M LiBF4/propylene carbonate electrolyte was injected into the pack to obtain a laminar **battery**. This **battery** was inserted in a holder having pressure-regulating screws to form a cassette-type **battery**. This cassette-type **battery** had an open-circuit voltage of 3.32 V, a coulombic efficiency of 92%, an energy efficiency of 86%, and a theor. energy d. of 280 W-h/kg at a 10 + 103-dyne/cm2 pressing of the laminar **battery**, vs. 3.12 V, 60%, 47%, and 168 W-h/kg resp., without pressing.

IC ICM H01M002-10
ICS H01M002-02; H01M010-40; H01M010-42

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST lithium polypyrrole **battery** pressing

IT **Batteries**, secondary
(laminar, lithium-polypyrrole, **battery** performance in relation to pressing of)

L22 ANSWER 8 OF 16 HCA COPYRIGHT 2006 ACS on STN

109:113454 Secondary solid-state **batteries** and their manufacture. Tonomura, Tadashi; Kanbara, Terutoshi; Kondo, Shigeo (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 63051064 A2 **19880304** Showa, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1986-194326 19860820.

AB The title **batteries** have a solid electrolyte contg. halide(**s**) of **Li**, Cu, or Ag sandwiched between a pair of electrodes prepd. from a mixt. of the electrolyte and a conductive material, and are prepd. by laminating electrolyte-plastic resin sheets with electrolyte-plastic resin-**conductive** material **sheets** by heating and/or pressing. The electrolyte is RbCl-CuCl-CuI, CuX-Cu2O-MoO3 (X = I or Br), AgI-Ag2O-MoO3, or LiI with the halogen being oxidized and reduced at the cathode during **battery** operation. Thus, a **battery** prepd. from a RbCu4I1.5Cl3.5 electrolyte sheet, electrode sheets of a 3:2 electrolyte-graphite mixt., and C-contg. resin collector films had O V output voltage and an internal resistance of 4 Ω. After being charged at 0.72 V for 1 h, the **battery** had a stable output voltage of 0.64 V when discharged at 20° and 10 mA. The stable output voltage of a Cu-Cu2S/RbCu4I1.5Cl3.5/TiS2 **battery** was 0.56 V. **Batteries** of the invention had longer lifetime than control **batteries**.

IC ICM H01M010-36
ICS H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** electrolyte rubidium copper halide; chloride

iodide rubidium copper electrolyte
IT **Batteries**, secondary
(solid-electrolyte, halogen-metal, manuf. of, in discharged state)
IT 10377-51-2P, Lithium iodide 73379-32-5P, Copper rubidium chloride iodide (Cu4RbCl3.5I1.5) 115866-44-9P, Copper molybdenum iodide oxide (Cu5Mo1.5I2O6) 116098-49-8P, Molybdenum silver iodide oxide (MoAg5I3O4)
(electrodes from mixts. of graphite and, manuf. of, for **batteries**)
IT 7782-42-5P, Graphite, uses and miscellaneous
(electrodes from mixts. of solid electrolytes and, manuf. of, for **batteries**)

L22 ANSWER 9 OF 16 HCA COPYRIGHT 2006 ACS on STN
108:207716 Carbon cathode current collectors for **lithium-sulfur** dioxide **batteries**. Anderman, Menahem (W. R. Grace and Co., USA). Eur. Pat. Appl. EP 256205 A1 **19880224**, 10 pp. DESIGNATED STATES: R: AT, BE, CH, DE, ES, FR, GB, IT, LI, NL, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1987-104026 19870319. PRIORITY: US 1986-896699 19860815.
AB The title collectors have a microporous (≥75% void vol.) sheet of a uniform mixt. of an ultrahigh mol.-wt. polyethylene 7-22, a conductive carbon black 78-93, and a plasticizer for polyethylene 0-2 vol.%. Thus, polyethylene (av. mol. wt. .apprx.5,000,000) 1.4, Shawinigan processed conductive acetylene black (d. 2.1 g/cm3, Brunauer-Emmet-Teller surface area 70 m2/g) 18, and a hydrocarbon oil (Sunthene 255) 42 parts were blended at 50 rpm and 160°, broken into small pieces, blended again, cooled in air, and pressed at 160° and 500 psi into 20-mil-thick sheets, immersed in cyclohexane for 3 10-mm periods, and dried to obtain **sheets** having a **cond.** of 0.2/Ω-cm. A collector was prepd. by pressing 1 prepd. sheet on each side of an Al screen at 150° and 250 psi and immersing in cyclohexane for 3 10-mm periods. The prepd. cathode had a thickness of 37 mil, void vol. of 82% with av. particle size of 0.2μ, and was flexible and cohesive.
IC ICM H01M004-96
ICS H01M006-14
ICA C08L023-06
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST sulfur dioxide **battery** carbon cathode; polyethylene carbon black cathode
IT Carbon black, uses and miscellaneous
(cathode current collectors, contg. ultrahigh mol.-wt. polyethylene, sulfur dioxide, for **batteries**)
IT Cathodes

(**battery**, sulfur dioxide, carbon current collectors for, ultrahigh mol.-wt. polyethylene-contg.)
IT 9002-88-4, Polyethylene
(cathode current collectors contg. ultrahigh mol.-wt., sulfur dioxide carbon, for **batteries**)

L22 ANSWER 10 OF 16 HCA COPYRIGHT 2006 ACS on STN
108:189838 Impedance spectroscopy for lithium passivation in lithium/thionyl chloride cells. Chenebault, Philippe; Vallin, Didier; Thevenin, Jacques; Wiart, Robert (Dep. Gener. Technol. Av., SAFT, Poitiers, 86009, Fr.). Proceedings - Electrochemical Society, 88-6(Proc. Symp. Primary Second. Ambient Temp. Lithium Batteries, 1987), 201-11 (English) **1988**. CODEN: PESODO. ISSN: 0161-6374.
AB The passivating layer on Li anodes in Li/SOCl2 **batteries** is affected during storage when SO2 and LiAlCl4.4SO3 are used as voltage delay prevention additives; during storage, intrinsic and extrinsic conduction processes change the layer morphol. and thickness. Under anodic polarization, the current flow induces hole formation in the layer and the electrode kinetics is governed by diffusion of Li+ through the holes, as detd. by impedance spectroscopy data.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
IT Electrolytic polarization
(anodic, of lithium anodes, passivation **layer cond.** and diffusion in relation to)
IT Passivation
(electrochem., of lithium anodes, in **battery**, impedance spectroscopy of)
IT 7446-09-5, Sulfur dioxide, uses and miscellaneous 7446-11-9D, **Sulfur** trioxide, compd. with **lithium** chloroaluminate 14024-11-4D, Lithium aluminum chloride (LiAlCl4), compd. with **sulfur** trioxide
(electrolyte contg., **lithium** anode passivation layer characteristics in relation to)

L22 ANSWER 11 OF 16 HCA COPYRIGHT 2006 ACS on STN
107:239794 Cathodes of organic-electrolyte **batteries**. Tago, Hideyuki; Oguro, Hidesuke; Nakai, Masaki; Hayakawa, Hayashi (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 62190658 A2 **19870820** Showa, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1986-31477 19860214.
AB Graphite fluoride cathodes of Li **batteries** are coated with a F-adsorbing **conductive layer** contg. graphite and active C on their collector side. The layer has a graphite:active C wt. ratio of 100:(1-10) and the active C has a surface area A >1000 m2/g. Thus, after discharging at a small

current, the F concn. at the Li and the cathode **conductive layer** sides were 35 and 1580 counts/**s** for a **Li battery** using a graphite fluoride cathode coated with a 10:0.5 graphite-active C (A = 1200 m2/g) **conductive layer** contg. water glass vs. 379 and 15 counts/s, resp., for a **battery** using a control **conductive layer**. **Batteries** of the invention showed lower and much stable internal resistance than control **batteries**.

IC ICM H01M004-06

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST cathode graphite fluoride active carbon; fluorine adsorption graphite fluoride cathode; **battery** graphite fluoride cathode coating

IT Cathodes
(**battery**, graphite fluoride, with fluorine-adsorbing graphite-active carbon coatings)

IT 7440-44-0, Carbon, uses and miscellaneous
(activated, cathodes coated with fluorine-adsorbing graphite and, graphite fluoride, for **batteries**)

IT 11113-63-6, Graphite fluoride
(cathodes, with fluorine-adsorbing graphite-active carbon coating, for **batteries**)

L22 ANSWER 12 OF 16 HCA COPYRIGHT 2006 ACS on STN

107:137556 A.c. impedance study of **lithium** in **sulfur** dioxide electrolytes. Geronov, I.; Puresheva, B.; Pavlova-Stoinov, B. (Cent. Lab. Electrochem. Power Sources, Sofia, 1040, Bulg.). Journal of Power Sources, 20(1-2), 37-45 (English) **1987**. CODEN: JPSODZ. ISSN: 0378-7753.

AB The kinetics of Li passivation in SO2-contg. electrolytes was studied using an a.c. impedance technique. Assuming an equiv. circuit of a solid ionic conductor on a non-blocking metal substrate, the resistance, thickness, and specific cond. of the passive film on Li were evaluated. The temp. of passivation has little effect on the rate of film growth. The influence of SO2 concn. and Li surface pretreatment on the impedance parameters during the storage of electrodes was also investigated. From Arrhenius plots of the **cond.** of the **film**, 2 activation energies were calcd., namely, 0.3 eV at -30 to -9°, and 0.45 eV at -9 to +25°.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

ST **lithium** passivation kinetics **sulfur** dioxide; **battery** anode lithium passivation kinetics

IT Electric impedance
(of **lithium** in **sulfur** dioxide electrolytes, kinetics of lithium passivation in relation to)

IT Kinetics of passivation
(electrochem., of **lithium**, in **sulfur** dioxide-contg. electrolytes, a.c. impedance in relation to, for **batteries**)
IT 7446-09-5, Sulfur dioxide, uses and miscellaneous
(electrolytes contg., lithium passivation in, kinetics of, for **batteries**)
IT 7550-35-8, **Lithium** bromide
(electrolytes, contg. **sulfur** dioxide, **lithium** passivation in, kinetics of, for **batteries**)
IT 7439-93-2, Lithium, reactions
(passivation of, kinetics of, in sulfur dioxide-contg. electrolytes, for **batteries**)

L22 ANSWER 13 OF 16 HCA COPYRIGHT 2006 ACS on STN
96:38372 Thermal regulation. Jacquelin, Jean; Pompon, Jean Paul (Compagnie Generale d'Electricite S. A., Fr.). Fr. Demande FR 2474195 A1 **19810724**, 12 pp. (French). CODEN: FRXXBL. APPLICATION: FR 1980-1290 19800122.
AB The efficiency of Na-**S** or **Li-S** **batteries** is increased by providing self-regulating temp. control. Thus, a Na-S **battery** operating best at 300-360° was encased in paraffin wax b. 300-360°, the wax was in turn encased in a heat-**conducting** material **covered** on the outside by a layer of KBr-KOH eutectic m. 300°, and the assembly was covered with a heat insulator.
IC G05D023-01; H01M010-50
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** sodium sulfur temp control
IT **Batteries**, secondary
(high-temp., self-regulating temp. control of)

L22 ANSWER 14 OF 16 HCA COPYRIGHT 2006 ACS on STN
87:138570 The effect of additives on lithium cycling in methyl acetate. Rauh, R. D.; Brummer, S. B. (EIC Corp., Newton, MA, USA). Electrochimica Acta, 22(1), 85-91 (English) **1977**. CODEN: ELCAAV. ISSN: 0013-4686.
AB MeOAc was examd. as a solvent for nonaq. secondary Li **batteries**. The efficiency of cycling Li on Ni in MeOAc-LiClO4 (1M) electrolyte contg. <10 ppm H2O was <10%, but increased on addn. of MeNO2 [75-52-5], SO2, or small amts. of H2O. MeOAc contg. SO2 or MeNO2 afforded more repeated cycles before failure of the working electrode than did propylene carbonate. Unlike propylene carbonate, the open circuit Li disappearance rate in MeOAc decreased in the presence of additives. The differences in behavior between propylene carbonate and MeOAc are attributed to the greater soly. of the MeOAc-Li reaction products, facilitating the buildup of additive-induced **conductive films** on

the metallic deposit.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium cycling methyl acetate; **battery** lithium anode cycling; nitromethane lithium anode cycling; **sulfur** dioxide **lithium** cycling; water lithium anode cycling
IT Anodes
(**battery**, lithium, cycling of, in org.-electrolyte **battery**, effect of additives on)
IT 7439-93-2, uses and miscellaneous
(anodes, cycling of, in org.-electrolyte **battery**, effect of additives on)
IT 7791-03-9
(**battery** electrolyte contg., lithium cycling in, effect of additives on)

L22 ANSWER 15 OF 16 HCA COPYRIGHT 2006 ACS on STN
86:174192 The effect of additives on lithium cycling in propylene carbonate. Rauh, R. D.; Brummer, S. B. (EIC Corp., Newton, MA, USA). Electrochimica Acta, 22(1), 75-83 (English) **1977**. CODEN: ELCAAV. ISSN: 0013-4686.
AB The efficiency of M LiClO4 [7791-03-9]-propylene carbonate solns. contg. additives for deposition and discharge of Li on Ni was examd. for use in secondary Li **batteries**. H2O (<0.06M), MeNO2 [75-52-5], and SO2 enhanced the cycling efficiency which was relatively low in dry electrolyte without additives. Deterioration in efficiency occurred for all additives after 10-20 repeated cycles. The decrease in the amt. of electrodeposited Li available for stripping was independent of the additives. The rate of capacity loss decreaed with time and reached a limiting value of 5-10 μA/cm2 which was not improved by the presence of additives. The loss of efficiency during Li cycling and also on open circuit is attributed to the encapsulation of Li granules by an insulating film of propylene carbonate-Li reaction products. The additives may form Li+-**conductive films** on the deposit allowing deposition onto the granules and their growth. On open circuit, the long-term equil. favors the formation of an insol. insulating film over the Li+-**conductive film**. Such behavior limits the usefulness of propylene carbonate in secondary Li **batteries**.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium cycling propylene carbonate; **battery** lithium anode cycling; nitromethane lithium anode cycling; water lithium anode cycling; **sulfur** dioxide **lithium** cycling
IT Anodes
(**battery**, lithium, cycling of, in org.-electrolyte **battery**, effect of additives on)
IT 7439-93-2, uses and miscellaneous
(anodes, cycling of, in org.-electrolyte **battery**,

effect of additives on)
IT 7791-03-9
(**battery** electrolyte contg., lithium cycling in, effect of additives on)

L22 ANSWER 16 OF 16 HCA COPYRIGHT 2006 ACS on STN
83:134928 Effect of additives in lithium cycling in methyl acetate. Rauh, R. David; Brummer, S. Barry (Eic Inc., Newton, MA, USA). U. S. NTIS, AD-A Rep., No. 006572, 22 pp. Avail. NTIS From: Gov. Rep. Announce. Index (U. S.) 1975, 75(10), 87 (English) **1975**. CODEN: XTSRDM.
AB Me acetate (MA) was examd. as a solvent for use in nonaq. secondary Li [7439-93-2] **batteries**. The efficiency of cycling Li on Ni in MA/MLiClO4 contg. <10 ppm H2O [7732-18-5] was <10%. Addn. of MeNo2 [75-52-5], SO2 [7446-09-5], or small amts. improved the efficiency markedly. Compared to propylene carbonate (PC), MA plus SO2 or MeNO2 afford more repeated cycles before failure of the working electrode. Unlike PC, the open-circuit corrosion rate of electrodeposited Li in MA is decreased in the presence of additives. The differences in behavior between PC and MA are attributed to the greater soly. of the MA-Li reaction products, allowing greater opportunity for buildup of additive-induced **conductive films** on the metallic deposit.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium anode org electrolyte; **battery** lithium anode corrosion; nitromethane lithium anode corrosion; **sulfur** oxide **lithium** corrosion
IT 7439-93-2, uses and miscellaneous
(anodes, in org.-electrolyte **battery**, corrosion and cycling of, effect of additives on)
IT 75-52-5 7446-09-5, uses and miscellaneous 7732-18-5
(**battery** electrolyte contg., org., lithium anode corrosion and cycling in)

=> D L50 1-22 CBIB ABS HITSTR HITIND

L50 ANSWER 1 OF 22 HCA COPYRIGHT 2006 ACS on STN
145:106844 Electrochemical device separator structures with barrier layer on non-swelling membrane. Visco, Steven J.; Katz, Bruce D. (Polyplus Battery Company, USA). U.S. US 7070632 B1 20060704, 16 pp. (English). CODEN: USXXAM. APPLICATION: US 2002-193652 20020709. PRIORITY: US 2001-307981P 20010725.

AB Disclosed are electrochem. device separator structures which include a substantially impervious active metal ion conducting barrier layer material, such as an ion conducting glass, is formed on an active metal ion conducting membrane in which elongation due to swelling on contact with liq. electrolyte is constrained in at least two of three orthogonal dimensions of the membrane. The non-swelling character of the membrane prevents elongation in the x-y (or lateral, relative to the layers of the composite) orthogonal dimensions of the membrane when it is contacted with liq. electrolyte that would otherwise cause the barrier layer to rupture. Substantial swelling of the membrane, if any, is limited to the z (or vertical, relative to the layers of the composite) dimension.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(electrochem. device separator structures with barrier layer on non-swelling membrane)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(glass; electrochem. device separator structures with barrier layer on non-swelling membrane)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

INCL 029623300; 429142000; 429144000; 429247000; 429316000; 429231950
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery** separator structure barrier layer nonswelling membrane
IT Secondary **batteries**
Secondary **battery** separators
(electrochem. device separator structures with barrier layer on non-swelling membrane)
IT 110-71-4, Glyme 646-06-0, Dioxolane **7439-93-2**, Lithium, uses 7440-09-7, Potassium, uses 7440-23-5, Sodium, uses **7704-34-9**, Sulfur, uses 9002-84-0, PTFE 9002-88-4, Polyethylene 9003-07-0, Polypropylene 25038-59-9, uses 90076-65-6 190673-42-8, Gore-Select
(electrochem. device separator structures with barrier layer on non-swelling membrane)
IT 10377-52-3, Lithium phosphate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide
(glass; electrochem. device separator structures with barrier layer on non-swelling membrane)

L50 ANSWER 2 OF 22 HCA COPYRIGHT 2006 ACS on STN
143:81150 Chemical protection of a lithium surface. De Jonghe, Lutgard; Visco, Steven J.; Nimon, Yevgeniy S.; Sukeshini, A. Mary (Polyplus Battery Co., USA). U.S. US 6911280 B1 20050628, 16 pp. (English). CODEN: USXXAM. APPLICATION: US 2002-327682 20021220. PRIORITY: US 2001-342326P 20011221.
AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alk. earth metals with incompatible processing and operating environments by creating a ionically **conductive** chem. **protective layer** on the lithium or other reactive metal surface. Such a chem. produced surface **layer** can **protect** lithium metal from reacting with oxygen, nitrogen or moisture in ambient atm. thereby allowing the lithium material to be handled outside of a controlled atm., such as a dry room. Prodn. processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form **neg. electrodes** for lithium metal **batteries**.
IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses
(chem. protection of lithium surface)
RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(glass; chem. protection of lithium surface)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M002-08
ICS H01M010-04; H01M010-26
INCL 429137000; 429246000; 429231900; 429231950; 429309000; 429319000; 429320000; 429321000; 429322000; 429126100
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 57
ST **battery** lithium surface chem protection
IT **Battery anodes**
**Battery** electrolytes
**Coating** materials
Electric conductors, glass
Evaporation
Glass ceramics
Polymer electrolytes
(chem. **protection** of lithium surface)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate **7439-93-2**, Lithium, uses 7440-09-7, Potassium, uses 7440-23-5, Sodium, uses 7440-50-8, Copper, uses **7704-34-9**, Sulfur, uses 70780-99-3, Lisicon 77641-62-4, Nasicon 302600-21-1
(chem. protection of lithium surface)
IT 7440-55-3, Gallium, uses 10377-52-3, Lithium phosphate

12024-22-5, Gallium sulfide (Ga2S3) 12025-34-2, Germanium sulfide (GeS2) 12136-58-2, Lithium sulfide (Li2S) 13759-10-9, Silicon sulfide (SiS2) **184905-46-2**, Lithium nitrogen phosphorus oxide
(glass; chem. protection of lithium surface)

L50 ANSWER 3 OF 22 HCA COPYRIGHT 2006 ACS on STN
141:426235 Electrolyte for thin film **battery**. Bates, John B. (Oak Ridge Micro-Energy, Inc., USA). U.S. US 6818356 B1 20041116, 10 pp. (English). CODEN: USXXAM. APPLICATION: US 2002-191859 20020709.

AB A solid amorphous electrolyte compn. for a thin-film **battery** is disclosed. The electrolyte compn. includes a lithium phosphorus oxynitride material contg. a sulfide ion dopant wherein the at. ratio of sulfide ion to phosphorus ion (S/P) in the electrolyte ranges greater than 0 up to about 0.2. The compn. is represented by the formula: LiwPOxNySz, where 2x+3y+2z = 5+w, x ranges from about 3.2 to about 3.8, y ranges from about 0.13 to about 0.46, z ranges from greater than zero up to about 0.2, and w ranges from about 2.9 to about 3.3. Thin-film **batteries** contg. the sulfide doped lithium oxynitride electrolyte are capable of delivering more power and energy than thin-film **batteries** contg. electrolytes without sulfide doping.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(sulfide-doped; electrolyte for thin film **battery**)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M006-46
ICS C23C014-34; C01B017-22; C01D001-02
INCL 429322000; 429127000; 429162000; 429231950; 252062200; 204192150; 423312000; 423594150
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST electrolyte thin film **battery**
IT **Battery** electrolytes
Secondary **batteries**
Sputtering
(electrolyte for thin film **battery**)
IT 7783-06-4, Hydrogen sulfide, processes 10377-48-7, Lithium sulfate

10377-52-3, Trilithium phosphate 12136-58-2, Lithium sulfide (Li2S)
(electrolyte for thin film **battery**)
IT 1314-62-1, Vanadium oxide (V2O5), uses 12031-65-1, Lithium nickel oxide (LiNiO2) 12057-17-9, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium oxide (CoLiO2) 50926-11-9, Ito 756868-81-2, **Lithium** nitrogen phosphorus **sulfur** oxide
(electrolyte for thin film **battery**)
IT 7440-37-1, Argon, uses 7727-37-9, Nitrogen, uses
(electrolyte for thin film **battery**)
IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(sulfide-doped; electrolyte for thin film **battery**)

L50 ANSWER 4 OF 22 HCA COPYRIGHT 2006 ACS on STN
141:298755 Ionically conductive membranes for protection of active metal **anodes** and **battery** cells. Visco, Steven J.; Nimon, Yevgeniy S.; Katz, Bruce D. (Polyplus Battery Company, USA). U.S. Pat. Appl. Publ. US 2004191617 A1 20040930, 25 pp., Cont.-in-part of U.S. Ser. No. 731,771. (English). CODEN: USXXCO. APPLICATION: US 2004-772228 20040203. PRIORITY: US 2002-418899P 20021015; US 2003-686189 20031014; US 2003-511710P 20031014; US 2003-518948P 20031110; US 2003-731771 20031205.
AB Disclosed are ionically conductive membranes for protection of active metal **anodes** and methods for their fabrication. The membranes may be incorporated in active metal **anode** structures and **battery** cells. In accordance with the invention, the membrane has the desired properties of high overall ionic cond. and chem. stability towards the **anode**, the **cathode** and ambient conditions encountered in **battery** manufg. The membrane is capable of protecting an active metal **anode** from deleterious reaction with other **battery** components or ambient conditions while providing a high level of ionic cond. to facilitate manuf. and/or enhance performance of a **battery** cell in which the membrane is incorporated.
IT **7439-93-2**, Lithium, uses **7439-93-2D**, Lithium, intercalation compd. **7704-34-9**, Sulfur, uses **184905-46-2**, Lithium nitrogen phosphorus oxide
(ionically conductive membranes for protection of active metal **anodes** and **battery** cells)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M002-16
ICS H01M010-36
INCL 429137000; 429246000; 429304000; 429320000
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **battery anode** ionically conductive membrane
IT **Battery anodes**
Ceramics
Gelation agents
Glass ceramics
Ionic liquids
Primary **batteries**
Secondary **batteries**
(ionically conductive membranes for protection of active metal **anodes** and **battery** cells)
IT Esters, uses
Ethers, uses
Fluoropolymers, uses
Halides
Metallic glasses
Nitrides
Phosphonium compounds
Polyoxyalkylenes, uses
Polysulfides
(ionically conductive membranes for protection of active metal

**anodes** and **battery** cells)

IT Glass, uses
(oxynitride, phosphorus; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT Group VA element compounds
(phosphides; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT Oxynitrides
(phosphorus, glass; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT Primary **batteries**
(solid-state; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT Quaternary ammonium compounds, uses
(tetraalkyl; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT Lithium alloy, base
(ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 1308-80-1, Copper nitride cu3n
(coating; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 1308-87-8, Dysprosium oxide (Dy2O3) 1308-96-9, Europium oxide (Eu2O3) 1310-53-8, Germanium dioxide, uses 1313-97-9, Neodymium oxide (Nd2O3) 1314-23-4, Zirconia, uses 1314-37-0, Ytterbium oxide (Yb2O3) 1314-56-3, Phosphorus oxide (P2O5), uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 12024-21-4, Gallium oxide (Ga2O3) 12036-41-8, Terbium oxide (Tb2O3) 12036-44-1, Thulium oxide (Tm2O3) 12055-62-8, Holmium oxide (Ho2O3) 12057-24-8, Lithium oxide (Li2O), uses 12060-58-1, Samarium oxide (Sm2O3) 12061-16-4, Erbium oxide (Er2O3) 12064-62-9, Gadolinium oxide (Gd2O3) 13463-67-7, Titania, uses
(glass-ceramic; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 10377-52-3 12024-22-5, Gallium sulfide ga2s3 12025-34-2, Germanium sulfide ges2 12136-58-2, Lithium sulfide (Li2S) 13759-10-9, Silicon sulfide sis2
(glass; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 79-20-9, Methyl acetate 96-47-9, 2-Methyltetrahydrofuran 105-58-8, Diethyl carbonate 107-31-3, Methyl formate 109-99-9, Thf, uses 110-71-4, 1,2-Dimethoxyethane 463-79-6D, Carbonic acid, org. esters 616-38-6, Dimethyl carbonate 623-53-0, Ethyl methyl carbonate 646-06-0, 1,3-Dioxolane 1072-47-5, 1,3-Dioxolane, 4-methyl- 1313-13-9, Manganese dioxide, uses 1313-27-5, Molybdenumoxide moo3, uses 1314-62-1, Vanadium oxide (V2O5), uses 1317-37-9, Iron sulfide Fes 1317-38-0, Copper oxide

(CuO), uses 1317-40-4, Copper sulfide Cus **7439-93-2**, Lithium, uses **7439-93-2D**, Lithium, intercalation compd. 7447-41-8, Lithium chloride (LiCl), uses 7550-35-8, Lithium bromide (LiBr) **7704-34-9**, Sulfur, uses 7784-01-2, Silver chromate 7789-24-4, Lithium fluoride, uses 9004-67-5, Methyl cellulose 10377-51-2, Lithium iodide 11105-02-5, Silver vanadium oxide 12037-42-2, Vanadium oxide v6o13 12039-13-3, Titanium sulfide (TiS2) 12057-29-3, Lithium phosphide li3p 12068-85-8, Iron sulfide fes2 12789-09-2, Copper vanadium oxide 15365-14-7, Iron lithium phosphate felipo4 16969-45-2D, Pyridinium, derivs. 17009-90-4D, Imidazolium, derivs. 24937-79-9, Pvdf 25014-41-9, Polyacrylonitrile 25322-68-3, Peo 26134-62-3, Lithium nitride (Li3N) 39300-70-4, Lithium nickeloxide 39457-42-6, Lithium manganese oxide 52627-24-4, Cobalt lithium oxide 70780-99-3, Lisicon 77641-62-4, Nasicon 155371-19-0, 1-Ethyl-3-methylimidazolium hexafluorophosphate **184905-46-2**, Lithium nitrogen phosphorus oxide 244193-50-8, 1-Hexyl-3-methylimidazolium tetrafluoroborate 328090-25-1 445473-58-5, 1-Butyl-3-methylimidazolium octyl sulfate
(ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 7440-50-8, Copper, uses
(substrate; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

IT 11138-49-1, Sodium β-alumina 37220-89-6, Lithium β-alumina
(β-alumina type; ionically conductive membranes for protection of active metal **anodes** and **battery** cells)

L50 ANSWER 5 OF 22 HCA COPYRIGHT 2006 ACS on STN

140:426171 Manufacture of inorganic **protective film coated** separator for secondary lithium battery and the battery. Cho, Jo-kun; Lee, Jong-ki; Lee, Sai-won; Lee, Sang-ryuk (Samsung Sdi Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2004158453 A2 20040603, 11 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-373605 20031031. PRIORITY: KR 2002-67680 20021102.

AB The battery has a separator between a cathode and an anode; where the battery has an inorg. **protective film** formed on ≥1 side of the separator. The separator is manufd. by depositing a Li metal on a separator and contacting the deposited separator with N, SO2, CO2, or O to form an inorg. **protective film.**

IT **668998-68-3P**, Lithium phosphorus nitride oxide (LiPNO)
(manuf. of separators contg. inorg. **protective films** for secondary lithium batteries)

RN 668998-68-3 HCA

CN Lithium phosphorus nitride oxide (LiPNO) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 1 | 17778-88-0 |
| O | 1 | 17778-80-2 |
| P | 1 | 7723-14-0 |
| Li | 1 | 7439-93-2 |

IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST secondary lithium battery inorg **protective film** **coated** separator manuf
IT Secondary battery separators
(manuf. of separators contg. inorg. **protective** **films** for secondary lithium batteries)
IT 7439-93-2, Lithium, processes 10377-52-3, Lithium phosphate
(manuf. of separators contg. inorg. **protective** **films** for secondary lithium batteries)
IT 9003-07-0, Polypropylene
(manuf. of separators contg. inorg. **protective** **films** for secondary lithium batteries)
IT 26134-62-3P, Lithium nitride (Li3N) **668998-68-3P**, Lithium phosphorus nitride oxide (LiPNO)
(manuf. of separators contg. inorg. **protective** **films** for secondary lithium batteries)

L50 ANSWER 6 OF 22 HCA COPYRIGHT 2006 ACS on STN
140:378090 **Anodes** for **lithium-sulfur** **batteries**, their manufacture, and **lithium-sulfur batteries** using them. Lee, Jong Ki; Lee, Je Won; Cho, Joung Keun; Lee, Sang Muk; Kim, Min Hyup (Samsung SDI Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2004139968 A2 20040513, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2003-276606 20030718. PRIORITY: KR 2002-63834 20021018.
AB The **anodes** for **lithium-sulfur** **batteries** are manufd. by forming a **pretreatment** **layer** (thickness 50-5000 Å) contg. Li+-conductive substances having ionic cond. ≥1 + 10-10 **S**/cm on **Li** metal by vapor deposition under inert gas atm. and forming a Li metal-**protective film** by vapor deposition. Preferably, the Li+-conductive substance may be Li3PO4 and the **protective layer** contains Li2.9PO3.3N0.46. **Lithium-sulfur** **batteries** contain the **anodes** above and **cathodes** contg. **cathode** active materials selected

from S element, S-series compds., and their mixts. The **anode pretreatment layer** shows high ionic cond. and no vol. expansion.

IT **7704-34-9, Sulfur,** uses
(**cathode;** manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **7439-93-2,** Lithium, uses
(manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

IT **150499-39-1,** Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3)
(**protective layer;** manuf. of **lithium -sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

RN 150499-39-1 HCA

CN Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.46 | 17778-88-0 |
| O | 0.3 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 2.9 | 7439-93-2 |

IC ICM H01M004-02
ICS H01M004-04; H01M004-40; H01M004-62; H01M010-40

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): **72**

ST **lithium sulfur battery anode**
**lithium** phosphate; phosphorus oxynitride lithium
**anode battery**

IT Controlled atmospheres
(inert, in vapor deposition; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT Secondary **batteries**
(**lithium-sulfur**; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **Battery anodes**
**Battery cathodes**
Ionic conductors
Vapor deposition process
(manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **7704-34-9, Sulfur**, uses
(**cathode**; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT 7440-01-9, Neon, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses
(inert atm. in vapor deposition; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **7439-93-2**, Lithium, uses
(manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT 10377-52-3, Lithium phosphate
(**pretreatment layer**; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

IT **150499-39-1**, Lithium metaphosphate nitride oxide (Li2.9(PO3)N0.46O0.3)
(**protective layer**; manuf. of **lithium-sulfur battery anodes** having **Li+-conductive pretreatment layer** and Li metal-**protective layer**)

L50 ANSWER 7 OF 22 HCA COPYRIGHT 2006 ACS on STN
140:324230 Lithium metal anode for lithium battery. Cho, Chung-Kun; Lee, Sang-Mock; Lee, Jong-Ki; Kim, Min-Seuk (Samsung SDI Co., Ltd., S. Korea). U.S. Pat. Appl. Publ. US 2004072066 A1 20040415, 5 pp. (English). CODEN: USXXCO. APPLICATION: US 2003-389752 20030318. PRIORITY: KR 2002-62256 20021012.

AB Provided is a lithium metal anode having a lithium metal layer and a porous polymer film integrated with a surface of the lithium metal layer. The lithium metal anode further includes a current collector attached to the surface of the lithium metal layer opposite the porous polymer film. The lithium metal anode further includes a **protective coating layer** between the porous polymer film and the lithium metal **layer**, the **protective coating layer** having lithium ionic cond. and impermeable to an electrolyte.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(lithium metal anode for lithium battery)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M002-16
ICS H01M002-18; H01M004-40; H01M010-04

INCL 429137000; 429231950; 429246000; 029623200

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, Dioxolane 7439-93-2, Lithium, uses 7439-93-2D, Lithium, salt 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 26134-62-3, Lithium nitride 33454-82-9, Lithium triflate 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide
(lithium metal anode for lithium battery)

L50 ANSWER 8 OF 22 HCA COPYRIGHT 2006 ACS on STN
140:131168 Apparatus and method for fracture absorption layer for use in

fabrication of thin-film electrochemical devices. Benson, Martin H.; Neudecker, Bernd J. (ITN Energym Systems, Inc., USA). U.S. Pat. Appl. Publ. US 2004023106 A1 20040205, 25 pp. (English). CODEN: USXXCO. APPLICATION: US 2002-210180 20020802.

AB An app. for use as a fracture absorption layer, an app. for use as an electrochem. device, and methods of manufg. the same are disclosed. The app. and methods of the present invention may be of particular use in the manuf. of thin-film, lightwt., flexible or conformable, electrochem. devices such as **batteries**, and arrays of such devices. The present invention may provide many advantages including stunting fractures in a first electrochem. layer from propagating in a second electrochem. layer.

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses **184905-46-2**, Lithium nitrogen phosphorus oxide
(app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **651045-64-6**, Lithium metaphosphate nitrate oxide (Li2.88(PO3)(NO3)0.14O0.31)
(sputter target; app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

RN 651045-64-6 HCA
CN Lithium metaphosphate nitrate oxide (Li2.88(PO3)(NO3)0.14O0.31) (9CI) (CA INDEX NAME)

| Component | Ratio | Component |
|---|---|---|

| | | Registry Number |
|---|---|---|
| O | 0.31 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| NO3 | 0.14 | 14797-55-8 |
| Li | 2.88 | 7439-93-2 |

IC ICM H01M006-00
INCL 429122000; 429126000
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): **72**
ST **battery** fabrication fracture absorption layer app; electrochem device fabrication fracture absorption layer app
IT Vapor deposition process
(plasma, arc, **cathodic**; app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)
IT Electrolytes
Primary **batteries**
(thin-film; app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)
IT 554-13-2, Lithium carbonate 1303-28-2, Arsenic oxide (As2O5) 1303-86-2, Boron oxide (B2O3), uses 1304-56-9, Beryllium oxide beo, uses 1306-38-3, Ceria, uses 1310-53-8, Germanium oxide (GeO2), uses 1314-23-4, Zirconia, uses 1314-36-9, Yttria, uses 1314-56-3, Phosphorus pentoxide, uses 1327-53-3, Arsenic oxide (As2O3) 1344-28-1, Alumina, uses 7429-90-5, Aluminum, uses **7439-93-2**, Lithium, uses 7440-20-2, Scandium, uses 7440-21-3, Silicon, uses 7440-31-5, Tin, uses 7440-38-2, Arsenic, uses 7440-41-7, Beryllium, uses 7440-42-8, Boron, uses 7440-45-1, Cerium, uses 7440-56-4, Germanium, uses 7440-65-5, Yttrium, uses 7440-67-7, Zirconium, uses 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide 7631-86-9, Silica, uses **7704-34-9**, Sulfur, uses 7723-14-0, Phosphorus, uses 7723-14-0D, Phosphorus, compd. 7789-24-4, Lithium fluoride, uses 7791-03-9, Lithium perchlorate 9002-84-0, Ptfe 9003-39-8, Polyvinylpyrrolidone 10043-11-5, Boron nitride (BN), uses 10377-48-7, LIthium sulfate 10377-51-2, Lithium iodide 10377-52-3, LIthium phosphate 11118-04-0, Lithium phosphorus nitride Li7PN4 11126-15-1, Lithium vanadium oxide 12003-67-7, Aluminum lithium oxide allio2 12005-14-0, Aluminum lithium oxide al5lio8 12025-11-5, Germanium lithium oxide geli4o4 12033-89-5, Silicon nitride, uses 12057-24-8, Lithia, uses 12060-08-1, Scandium oxide (Sc2O3) 12065-36-0, Germanium nitride ge3n4 12136-91-3, Phosphorus nitride p3n5 12169-03-8, Lithium yttrium oxide liyo2 12209-15-3, Lithium scandium oxide lisco2 12232-41-6, Beryllium lithium oxide Be2Li2O3 12355-58-7, Aluminum

lithium oxide alli5o4 12384-10-0, Lithium zirconium oxide li8zro6 12408-97-8, Boron lithium nitride BLi3N2 12521-45-8, Lithium silicon nitride LiSi2N3 12521-55-0, Lithium silicon nitride Li2SiN2 12521-66-3, Lithium silicon nitride Li8SiN4 13453-69-5, Lithium borate libo2 13453-84-4, Lithium silicon oxide li4sio4 13478-14-3, Lithium arsenate 14024-11-4, Aluminum lithium chloride AlLiCl4 14283-07-9, Lithium tetrafluoroborate 15138-76-8, Lithium tetrafluoroaluminate 17739-47-8, Phosphorus nitride pn 19497-94-0, Aluminum lithium silicate allisio4 21324-40-3, Lithium hexafluorophosphate 24304-00-5, Aluminum nitride Aln 25322-68-3, Polyethylene oxide 25658-42-8, Zirconium nitride (ZrN) 25764-13-0, Yttrium nitride (YN) 26134-62-3, Lithium nitride li3n 30622-39-0, LIthium titanium phosphate LiTi2(PO4)3 39300-70-4, Lithium nickel oxide 39449-52-0, Lithium oxide silicate (Li8O2(SiO4)) 39457-42-6, Lithium manganese oxide 56320-64-0 57349-02-7, Cerium lithium oxide celio2 60883-88-7, Lithium phosphorus nitride LiPN2 61027-73-4, Aluminum lithium nitride AlLi3N2 62795-18-0 66581-07-5 66581-08-6 67181-65-1, Lithium silicon nitride Li5SiN3 76068-31-0 87796-15-4, Lithium scandium phosphate Li3Sc2(PO4)3 101993-97-9, Lithium phosphate silicate Li3.6(PO4)0.4(SiO4)0.6 111706-40-2, Cobalt lithium oxide CoLi0-1O2 113957-82-7, Lithium silicon nitride Li21Si3N11 113957-83-8, Lithium silicon nitride Li18Si3N10 143080-25-5, Phosphorus nitride oxide p4n6o 170171-06-9, Aluminum lithium fluoride AlLiF4 **184905-46-2**, Lithium nitrogen phosphorus oxide 651045-58-8, Lithium nitrogen phosphorus tin oxide
(app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

IT 7446-07-3, Tellurium oxide 7446-08-4, Selenium oxide seo2 7782-49-2, Selenium, processes 12031-80-0, Lithium oxide li2o2 12142-83-5, Tin nitride Sn3N4 12188-25-9, Lithium tin oxide li2sno3 12286-33-8, Tin phosphide Sn4P3 12344-15-9, Lithium tin oxide li8sno6 12372-55-3 12640-89-0, Selenium oxide 13451-18-8, Tellurium oxide teo3 13494-80-9, Tellurium, processes 13762-75-9, Lithium metaphosphate 13843-41-9, Lithium pyrophosphate 15578-26-4, Tin phosphate Sn2P2O7 15578-32-2, Tin phosphate Sn3(PO4)2 18282-10-5, Tin dioxide 23369-45-1, Phosphorus nitride oxide pno 25324-56-5, Tin phosphide SnP 37221-29-7, Sulfur nitride 37367-13-8, Tin phosphide SnP3 50645-72-2, Lithium tin phosphide Li5SnP3 50645-73-3, Lithium tin phosphide Li8SnP4 53680-59-4 102055-50-5, Lithium silicon nitride 116301-91-8, Phosphorous acid, trilithium salt 161286-52-8, Lithium sulfide thiosilicate (Li1.2S0.2(SiS3)0.4) 651045-60-2, Lithium phosphide (Li0-3P) 651045-62-4, Lithium nitride phosphide (Li10N10P) **651045-64-6**, Lithium metaphosphate nitrate oxide (Li2.88(PO3)(NO3)0.14O0.31)
(sputter target; app. and method for fracture absorption layer for use in fabrication of thin-film electrochem. devices)

L50 ANSWER 9 OF 22 HCA COPYRIGHT 2006 ACS on STN
138:240682 Encapsulated alloy electrodes for batteries. Visco, Steven J.; Nimon, Yevgeniy S.; Katz, Bruce D. (Polyplus Battery Company, USA). PCT Int. Appl. WO 2003023879 A2 20030320, 39 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2002-US28189 20020904. PRIORITY: US 2001-318552P 20010910; US 2002-189908 20020703.

AB Disclosed are methods for forming active metal battery alloy electrodes having **protective layers** ("encapsulated electrodes"). Charged and uncharged encapsulated alloy electrodes and methods for their fabrication are provided.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide (glass barrier layer; encapsulated alloy electrodes for batteries)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 56

IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide (glass barrier layer; encapsulated alloy electrodes for batteries)

L50 ANSWER 10 OF 22 HCA COPYRIGHT 2006 ACS on STN
137:188206 Solid electrolyte battery and its manufacture. Mino, Shinji; Iwamoto, Kazuya; Unoki, Shigeyuki; Ishii, Hironori (Matsushita Electric Industrial Co., Ltd., Japan). PCT Int. Appl. WO 2002065573

A1 **20020822**, 46 pp. DESIGNATED STATES: W: JP, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (Japanese). CODEN: PIXXD2. APPLICATION: WO 2002-JP1163 20020212. PRIORITY: JP 2001-38561 20010215.

AB The battery has a substrate selected from metal, semiconductor, glass, ceramic, and resin having a recessed area and ≥1 of electrode active mass-solid electrolyte-electrode active mass laminates in the recessed area. The battery is prepd. by forming the recessed area on the substrate, and forming the laminates in the area.

IT **203402-92-0**, Lithium nitride phosphate
(structure and manuf. of secondary solid electrolyte lithium batteries on substrates with recessed areas)

RN 203402-92-0 HCA

CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O4P | x | 14265-44-2 |
| Li | x | 7439-93-2 |

IC ICM H01M010-40
ICS H01M006-18; H01M002-26; H01M004-64

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 7631-86-9, Silica, uses
(manuf. of secondary solid electrolyte lithium batteries with silica **protection films** on substrates with recessed areas)

IT 7439-93-2, Lithium, uses 7782-42-5, Graphite, uses 12190-79-3, Cobalt lithium oxide (CoLiO2) 39457-42-6, Lithium manganese oxide **203402-92-0**, Lithium nitride phosphate
(structure and manuf. of secondary solid electrolyte lithium batteries on substrates with recessed areas)

L50 ANSWER 11 OF 22 HCA COPYRIGHT 2006 ACS on STN

137:111659 Thin inorganic solid electrolyte film and lithium **battery** component thereof. Kugai, Yuichi; Ota, Yukihiro; Yamanaka, Shosaku (Sumitomo Electric Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002203593 A2 **20020719**, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-337406 20001106. PRIORITY: JP 2000-323108 20001023.

AB The electrolyte film has a compn. contg. **Li**, **S**, Ag, and elements selected from P, Si, B, Ge, and Ga. The Li **battery** component has the electrolyte film formed on a Li or Li contg. alloy layer, and is used as **battery anode**.

IT **443129-93-9**, Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9)
(compns. of silver contg. solid inorg. electrolyte films on **anodes** for secondary lithium **batteries**)
RN 443129-93-9 HCA
CN Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.1 | 17778-88-0 |
| O | 0.9 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3 | 7439-93-2 |

IC ICM H01M010-36
ICS H01M010-36; C23C014-06; H01M004-02
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium **battery** inorg solid electrolyte compn; **anode** solid electrolyte laminate lithium **battery**
IT **Battery** electrolytes
(compns. of silver contg. solid inorg. electrolyte films on **anodes** for secondary lithium **batteries**)
IT **Battery anodes**
(lithium **anodes** laminated with silver contg. inorg. solid electrolyte films for secondary lithium **batteries**)
IT Secondary **batteries**
(lithium; lithium **anodes** laminated with silver contg. inorg. solid electrolyte films for secondary lithium **batteries**)
IT 7440-22-4, Silver, uses 10377-52-3, Lithium phosphate 12136-58-2, Lithium sulfide 13453-84-4, Lithium silicate (Li4SiO4) 13759-10-9, Silicon disulfide **443129-93-9**, Lithium metaphosphate nitride oxide (Li3(PO3)N0.1O0.9)
(compns. of silver contg. solid inorg. electrolyte films on **anodes** for secondary lithium **batteries**)
IT 7439-93-2, Lithium, uses
(lithium **anodes** laminated with silver contg. inorg. solid electrolyte films for secondary lithium **batteries**)

L50 ANSWER 12 OF 22 HCA COPYRIGHT 2006 ACS on STN
136:186681 Layered arrangements of **lithium anodes** for **lithium-sulfur batteries**. Chu, May-Ying; Visco, Steven J.; Dejonghe, Lutgard C. (Polyplus Battery

Company, USA). PCT Int. Appl. WO 2002015301 A2 **20020221**, 51 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US24342 20010802. PRIORITY: US 2000-640467 20000816.

AB A method employing a bonding layer is used to form active metal **electrodes** having barrier layers. Active metals such as lithium are highly reactive in ambient conditions. The method involves fabricating a lithium **electrode** or other active metal **electrode** without depositing the barrier layer on a layer of metal. Rather a smooth barrier layer is formed on a smooth substrate such as a web carrier or polymeric electrolyte. A bonding or alloying layer is formed on top of the barrier layer. Lithium or other active material is then attached to the bonding layer to form the active metal **electrode**. A current collector may also be attached to the lithium or active metal during the process.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide (releasable web carrier layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-00

CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium sulfur battery anode** layered arrangement

IT Vapor deposition process (chem.; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT **Battery anodes** (layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Polyethers, uses

Polymer blends
Polyoxyalkylenes, uses
Polyphosphazenes
Polythioethers
(layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Polyesters, uses
(layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Sulfide glasses
(lithium borosulfide, releasable web carrier layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Sulfide glasses
(lithium silicon sulfide, releasable web carrier layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Primary **batteries**
(lithium; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Vapor deposition process
(phys.; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Imines
(polyimines; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Glass, uses
Polymers, uses
(releasable web carrier layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Aluminum alloy, base
Titanium alloy, base
(foil bonding layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT Lithium alloy, base
(layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-36-0, Antimony, uses
(foil bonding layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

IT 7439-93-2, Lithium, uses
(layered arrangements of **lithium anodes** for

**lithium-sulfur batteries**)
IT 12798-95-7
(layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)
IT 25038-59-9, Polyethylene terephthalate, uses
(layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)
IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide
(releasable web carrier layer; layered arrangements of **lithium anodes** for **lithium-sulfur batteries**)

L50 ANSWER 13 OF 22 HCA COPYRIGHT 2006 ACS on STN
136:137424 Fabrication of lithium **anodes** and **batteries**. Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.; Affinito, John (USA). U.S. Pat. Appl. Publ. US 2002012846 A1 **20020131**, 22 pp., Cont.-in-part of U.S. Ser. No. 721,578. (English). CODEN: USXXCO. APPLICATION: US 2001-864890 20010523. PRIORITY: US 1999-167171P 19991123; US 2000-721578 20001121; US 2000-721519 20001121.
AB Provided is an **anode** for use in **electrochem. cells**, wherein the **anode** active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion **conducting layers** and polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate **protective layer**, such as a temporary **protective** metal **layer**, on the surface of the lithium-contg. first layer. Another aspect of the invention provides an **anode** active layer formed by the in-situ deposition of lithium vapor and a reactive gas. The **anodes** of the current invention are particularly useful in **electrochem. cells** comprising **sulfur**-contg. **cathode** active materials, such as elemental sulfur.
IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses **184905-46-2**, Lithium nitrogen phosphorus oxide
(fabrication of **lithium anodes** and **batteries**)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-40
ICS H01M004-66; B05D005-12
INCL 429231950
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery anode** lithium; **sulfur** contg **cathode battery lithium anode**
IT Polyesters, uses
(acrylates; fabrication of lithium **anodes** and **batteries**)
IT **Battery anodes**
(fabrication of lithium **anodes** and **batteries**)
IT Acrylic polymers, uses
(fabrication of lithium **anodes** and **batteries**)
IT Polyoxyalkylenes, uses
(fabrication of lithium **anodes** and **batteries**)
IT Hydrocarbons, uses
(fabrication of lithium **anodes** and **batteries**)
IT Borate glasses
(lithium borate; fabrication of lithium **anodes** and **batteries**)
IT Phosphate glasses
(lithium phosphate; fabrication of lithium **anodes** and **batteries**)
IT Sulfide glasses
(lithium phosphosulfide; fabrication of lithium **anodes** and **batteries**)
IT Silicate glasses
(lithium silicate; fabrication of lithium **anodes** and **batteries**)

IT Secondary **batteries**
(lithium; fabrication of lithium **anodes** and **batteries**)
IT 7631-86-9, Fumed silica, uses
(colloidal; fabrication of lithium **anodes** and **batteries**)
IT 110-71-4 646-06-0, 1,3-Dioxolane 1344-28-1, Dispal 11N7-12, uses **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses 12031-63-9, Lithium niobium oxide (LiNbO3) 12769-51-6, Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 90076-65-6, Lithium bis(trifluoromethylsulfonyl)imide 152747-89-2, Lanthanum lithium oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 342379-43-5, Germanium lithium sulfide
(fabrication of **lithium anodes** and **batteries**)
IT 9002-89-5, Airvol 125 25322-68-3, Peo 64401-02-1, CD 9038 221629-51-2, CN 984
(fabrication of lithium **anodes** and **batteries**)
IT 74-85-1, Ethylene, uses 74-86-2, Acetylene, uses 124-38-9, Carbon dioxide, uses 7440-50-8, Copper, uses 7446-09-5, Sulfur dioxide, uses 7727-37-9, Nitrogen, uses
(fabrication of lithium **anodes** and **batteries**)

L50 ANSWER 14 OF 22 HCA COPYRIGHT 2006 ACS on STN
135:168869 **Protective coating** for separators for electrochemical cells. Ying, Qicong; Carlson, Steven A.; Skotheim, Terje A. (Moltech Corporation, USA). U.S. US 6277514 B1 **20010821**, 29 pp., Cont.-in-part of U.S. 6,183,901. (English). CODEN: USXXAM. APPLICATION: US 1999-447901 19991123. PRIORITY: US 1998-215029 19981217; US 1999-399967 19990921.
AB This invention pertains to separators for use in electrochem. cells which comprise at least one microporous pseudo-boehmite layer, which separator is in contact with at least one **protective coating layer** positioned on the anode-facing side of the separator opposite from the cathode active layer in the cell; electrolyte elements comprising such separators; elec. current producing cells comprising such separators; and methods of making such separators, electrolyte elements and cells.
IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(**protective coating** for separators for electrochem. cells)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component |
|---|---|---|

| | | Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M002-14
INCL 429129000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST battery separator pseudoboehmite **protective coating**
IT Synthetic rubber, uses
(acrylonitrile-butadiene-methacrylic acid; **protective coating** for separators for electrochem. cells)
IT Synthetic rubber, uses
(acrylonitrile-butadiene-styrene, carboxylated; **protective coating** for separators for electrochem. cells)
IT Glass, uses
(ion **conducting; protective coating** for separators for electrochem. cells)
IT **Coating** process
**Conducting** polymers
Secondary batteries
Secondary battery separators
(**protective coating** for separators for electrochem. cells)
IT ABS rubber
Acrylic polymers, uses
Nitrile rubber, uses
Polyacenes
Polyacetylenes, uses
Polyolefins
Polyurethanes, uses
Styrene-butadiene rubber, uses
(**protective coating** for separators for electrochem. cells)
IT 9003-56-9
(abs rubber, **protective coating** for separators for electrochem. cells)
IT 9003-18-3
(nitrile rubber, **protective coating** for separators for electrochem. cells)
IT 110-71-4 646-06-0, 1,3-Dioxolane 1318-23-6, Pseudoboehmite 7704-34-9, Sulfur, uses
(**protective coating** for separators for

electrochem. cells)

IT 64401-02-1 221629-51-2, CN 984
(**protective coating** for separators for electrochem. cells)

IT 9003-19-4, Polyvinyl ether 9003-39-8, polyvinylpyrrolidone 9003-63-8, Poly(butyl methacrylate) 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 25067-58-7, Polyacetylene 25190-62-9, Poly(p-phenylene) 28774-98-3, Poly(naphthalene-2,6-diyl) 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 82451-56-7, Polyazulene 96638-49-2, Poly(phenylenevinylene) 114239-80-4, Poly(perinaphthalene) 146701-60-2, CAB-O-SIL TS-530 152747-89-2, Lanthanum lithium oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 211431-21-9, Escure kto 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide
(**protective coating** for separators for electrochem. cells)

IT 9003-55-8
(styrene-butadiene rubber, **protective coating** for separators for electrochem. cells)

L50 ANSWER 15 OF 22 HCA COPYRIGHT 2006 ACS on STN

135:7792 Lithium **anodes** for **electrochemical cells**. Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V. (Moltech Corporation, USA). PCT Int. Appl. WO 2001039303 A1 **20010531**, 41 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32234 20001121. PRIORITY: US 1999-PV167171 19991123.

AB Provided are lithium **anodes** for use in **electrochem. cells**, where the **anode** active layer has a first layer comprising lithium metal and a second layer of a temporary protective material, wherein the temporary protective material is a metal capable of forming an alloy with lithium metal or is capable of diffusing into lithium metal. The present invention also pertains to methods of forming such **anodes**, **electrochem. cells** comprising such **anodes**, and methods of making such cells.

IT **7439-93-2**, lithium, uses **7704-34-9**, **Sulfur**, uses

(**lithium anodes** for **electrochem. cells**)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(lithium **anodes** for **electrochem. cells**)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-02
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** lithium **anode**
IT **Battery anodes**
Conducting polymers
Laser ablation
Sputtering
(lithium **anodes** for **electrochem. cells**)
IT Polyolefins
(lithium **anodes** for **electrochem. cells**)
IT Polyesters, uses
(lithium **anodes** for **electrochem. cells**)
IT Polymers, uses
(lithium **anodes** for **electrochem. cells**)
IT Primary **batteries**

(lithium; lithium **anodes** for **electrochem. cells**)

IT Hydrocarbons, uses
(polymers; lithium **anodes** for **electrochem. cells**)

IT Polymers, uses
(sulfonated; lithium **anodes** for **electrochem. cells**)

IT Evaporation
(thermal; lithium **anodes** for **electrochem. cells**)

IT Jets
(vapor deposition; lithium **anodes** for **electrochem. cells**)

IT 110-71-4 646-06-0, 1,3-Dioxolane **7439-93-2**, lithium, uses **7704-34-9**, **Sulfur**, uses 12769-51-6, Lithium tantalum oxide 83416-06-2, Tetraethylene glycol divinyl ether 90076-65-6, Lithium bis(trifluoromethylsulfonyl)imide
(**lithium anodes** for **electrochem. cells**)

IT 7440-44-0, Carbon, uses
(lithium **anodes** for **electrochem. cells**)

IT 67-63-0, Isopropyl alcohol, uses
(lithium **anodes** for **electrochem. cells**)

IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium oxide 12627-14-4, Lithium silicate 12674-25-8, Germanium lithium oxide 17372-42-8 25038-59-9, Polyethylene terephthalate, uses 37220-89-6, Lithium aluminate 152747-89-2, Lanthanum lithium oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 342379-43-5, Germanium lithium sulfide
(lithium **anodes** for **electrochem. cells**)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-43-9, Cadmium, uses 7440-50-8, Copper, uses 7440-55-3, Gallium, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses
(temporary protective metal; lithium **anodes** for **electrochem. cells**)

L50 ANSWER 16 OF 22 HCA COPYRIGHT 2006 ACS on STN
135:7791 Lithium **anodes** for **electrochemical cells**. Skotheim, Terje A.; Sheehan, Christopher J.; Mikhaylik, Yuriy V.; Affinito, John (Moltech Corporation, USA). PCT

Int. Appl. WO 2001039302 A1 **20010531**, 39 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2000-US32232 20001121. PRIORITY: US 1999-PV167171 19991123.

AB Provided is an **anode** for use in **electrochem. cells**, wherein the **anode** active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion **conducting layers** and crosslinked polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate **protective layer**, such as a temporary **protective** metal **layer**, or plasma CO2 treatment layers on the surface of the lithium-contg. first layer. The **anodes** of the current invention are particularly useful in **electrochem. cells** comprising **sulfur** -contg. **cathode** active materials, such as elemental sulfur.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide (glass; lithium **anodes** for **electrochem. cells**)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses (**lithium anodes** for **electrochem. cells**)

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M004-02
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery anode**
IT **Battery anodes**
(lithium **anodes** for **electrochem. cells**)
IT Acrylic polymers, uses
(lithium **anodes** for **electrochem. cells**)
IT Glass, uses
(lithium **anodes** for **electrochem. cells**)
IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium oxide 12627-14-4, Lithium silicate 12676-27-6 12769-51-6, Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide
(glass; lithium **anodes** for **electrochem. cells**)
IT **7439-93-2**, Lithium, uses **7704-34-9**, **Sulfur**, uses
(**lithium anodes** for **electrochem. cells**)
IT 7429-90-5, Aluminum, uses 7439-95-4, Magnesium, uses 7440-31-5, Tin, uses 7440-66-6, Zinc, uses
(lithium **anodes** for **electrochem. cells**)

L50 ANSWER 17 OF 22 HCA COPYRIGHT 2006 ACS on STN
133:122729 Addition of a thin-film inorganic solid electrolyte (Lipon) as a **protective film** in lithium batteries with a liquid electrolyte. Dudney, N. J. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN, 37831-6030, USA). Journal of Power Sources, 89(2), 176-179 (English) **2000**. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier Science S.A..
AB Three rechargeable lithium cells have been fabricated using thin films of Li and sputter-deposited LixMn2-yO4 as the electrodes, and

a LiPF6 org. liq. electrolyte. Cells were cycled up to 18 times between 4.5 and 2.5 V at 25°C both with and without the addn. of the thin-film lithium phosphorus oxynitride solid electrolyte, known as Lipon. Of the cells tested, the Lipon film was most effective in maximizing the capacity and cycling efficiency when deposited in direct contact with the cathode; however, a significant improvement over the Lipon-free cell was also obsd. with Lipon sandwiched between layers of the liq. electrolyte. In the latter case, the Lipon was deposited onto a microporous polypropylene separator membrane.

IT **285572-10-3**, Lithium phosphorus nitride oxide (Li3.3-3.6PN0.24-0.69O3.3-3.8)
(addn. of a thin-film inorg. solid electrolyte (Lipon) as a **protective film** in lithium batteries with a liq. electrolyte)

RN 285572-10-3 HCA

CN Lithium metaphosphate nitride oxide (Li3.3-3.6(PO3)N0.24-0.69O0.3-0.8) (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | 0.24 - 0.69 | 17778-88-0 |
| O | 0.3 - 0.8 | 17778-80-2 |
| O3P | 1 | 15389-19-2 |
| Li | 3.3 - 3.6 | 7439-93-2 |

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72

IT Battery electrolytes
(addn. of a thin-film inorg. solid electrolyte (Lipon) as a **protective film** in lithium batteries with a liq. electrolyte)

IT Secondary batteries
(lithium; addn. of a thin-film inorg. solid electrolyte (Lipon) as a **protective film** in lithium batteries with a liq. electrolyte)

IT **285572-10-3**, Lithium phosphorus nitride oxide (Li3.3-3.6PN0.24-0.69O3.3-3.8)
(addn. of a thin-film inorg. solid electrolyte (Lipon) as a **protective film** in lithium batteries with a liq. electrolyte)

L50 ANSWER 18 OF 22 HCA COPYRIGHT 2006 ACS on STN

133:32696 **Protective coating** for **battery** separators with microporous pseudo-boehmite layer. Ying, Qicong; Carlson, Steven A.; Skotheim, Terje A. (Moltech Corporation, USA). PCT Int. Appl. WO 2000036671 A1 **20000622**, 76 pp.

DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US30214 19991216. PRIORITY: US 1998-215029 19981217; US 1999-399967 19990921; US 1999-447901 19991123.

AB This invention pertains to separators for use in **electrochem** . **cells** which comprise at least one microporous pseudo-boehmite layer, which separator is in contact with at least one **protective coating layer** positioned on the **anode**-facing side of the separator opposite from the **cathode** active layer in the **cell** ; **electrolyte** elements comprising such separators; elec. current producing cells comprising such separators; and methods of making such separators, **electrolyte** elements and **cells**.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide (**ion-conducting** glass; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IT **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses (**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

RN 7439-93-2 HCA

CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

RN 7704-34-9 HCA

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IC ICM H01M002-16
ICS H01M010-40; B01D071-02
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 57
ST **battery** separator microporous pseudoboehmite **layer** polymer **protective coating**
IT Polyesters, uses
(acrylates; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Sulfide glasses
(germanium lithium sulfide; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Styrene-butadiene rubber, uses
(hydrogenated, block, triblock; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Sulfide glasses
(lithium phosphorus sulfide; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT Polyurethanes, uses
(polyoxyalkylene-, acrylic; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT **Battery anodes**
**Coating** process
**Conducting** polymers
Electric **conductors**, glass
Secondary **batteries**
Secondary **battery** separators
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT ABS rubber
Nitrile rubber, uses
Polyacenes
Polyacetylenes, uses
Polyolefins
Polyurethanes, uses
Styrene-butadiene rubber, uses
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)

IT 9003-56-9
(abs rubber, **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 10377-52-3, **Lithium** phosphate 12627-14-4, **Lithium** silicate 12676-27-6 37220-89-6, **Lithium** aluminate 39302-37-9, **Lithium** titanium oxide 152747-89-2, LAnthanum **lithium** oxide **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, **Lithium** silicide sulfide 236388-74-2, **Lithium** boride sulfide 236388-75-3, Aluminum **lithium** sulfide
(**ion-conducting** glass; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 9003-18-3
(nitrile rubber, **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 7631-86-9, Silica, uses
(pigment; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 110-71-4 646-06-0, 1,3-Dioxolane **7439-93-2**, Lithium, uses **7704-34-9**, Sulfur, uses 63957-70-0, Pseudoboehmite 90076-65-6
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 9003-19-4, Polyvinyl ether 9003-39-8, Polyvinyl pyrrolidone 9003-63-8, Polybutyl methacrylate 25067-58-7, Polyacetylene 25190-62-9, Poly(p-phenylene) 28774-98-3, Poly(naphthalene-2,6-diyl) 64401-02-1D, polymer withurethane acrylate 82451-56-7, Polyazulene 96638-49-2, Poly(phenylenevinylene) 114239-80-4, Poly(perinaphthalene)
(**protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 106107-54-4 694491-73-1
(styrene-butadiene rubber, hydrogenated, block, triblock; **protective coating** for **battery** separators with microporous pseudo-boehmite layer)
IT 9003-55-8
(styrene-butadiene rubber, **protective coating** for **battery** separators with microporous pseudo-boehmite layer)

L50 ANSWER 19 OF 22 HCA COPYRIGHT 2006 ACS on STN
132:125362 **Protective coatings** for battery anodes.
Visco, Steven J.; Chu, May-Ying (Polyplus Battery Company, Inc., USA). U.S. US 6025094 A **20000215**, 18 pp., Cont.-in-part

of U.S. 5,789,108. (English). CODEN: USXXAM. APPLICATION: US 1998-86665 19980529. PRIORITY: US 1994-344384 19941123; US 1995-479687 19950607; US 1996-686609 19960726; US 1997-814927 19970311.

AB Disclosed is an alkali metal neg. electrode having a **protective layer**. Specifically, the disclosed neg. electrode includes a glassy or amorphous surface **protective layer** which **conducts** alkali metal ions but effectively blocks the alkali metal in the electrode from direct contact with the ambient. The **protective layer** has improved smoothness and reduced internal stress in comparison to prior **protective layers** such as those formed by sputtering. In a specific embodiment, the **protective layer** is formed on the lithium metal electrode surface by a plasma assisted deposition technique.

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(**protective coatings** for battery anodes)

RN 184905-46-2 HCA

CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-58

INCL 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery anode **protective coating**

IT Coating process
(plasma spraying; **protective coatings** for battery anodes)

IT Battery anodes
**Coating** materials
Secondary batteries
(**protective coatings** for battery anodes)

IT Lithium alloy, base
Sodium alloy, base
(**protective coatings** for battery anodes)

IT 3277-26-7, 1,1,3,3-Tetramethyldisiloxane 7440-21-3D, Silicon, org. compds., reactions 7440-42-8, Boron, reactions 7723-14-0, Phosphorus, reactions
(precursor; **protective coatings** for battery anodes)

IT 7439-93-2, Lithium, uses 7440-23-5, Sodium, uses 12798-95-7

256448-58-5, CZ50
(**protective coatings** for battery anodes)
IT 554-13-2, Lithium carbonate 1303-86-2, Boron oxide b2o3, uses
1314-80-3, Phosphorus pentasulfide 7631-86-9, Silica, uses
10377-51-2, Lithium iodide 10377-52-3, Lithium phosphate li3po4
12057-24-8, Lithia, uses 12627-14-4, Lithium silicate 12676-27-6
26134-62-3, Lithium nitride 37220-89-6, Lithium aluminate
**184905-46-2**, Lithium nitrogen phosphorus oxide
236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride
sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4,
Lithium phosphide sulfide
(**protective coatings** for battery anodes)

L50 ANSWER 20 OF 22 HCA COPYRIGHT 2006 ACS on STN
131:312496 Encapsulated lithium **electrodes** having glass
**protective layers** and method for their
preparation. Visco, Steve J.; Tsang, Floris Y. (Polyplus Battery
Company, Inc., USA). PCT Int. Appl. WO 9957770 A1 **19991111**
, 33 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR,
BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,
LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,
SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY,
KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY,
DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT,
SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO
1999-US6895 19990329. PRIORITY: US 1998-83947 19980501; US
1998-139601 19980825.
AB A method for fabricating an active metal **electrode**
involves depositing lithium or other active metal **electrode**
on a **protective layer**. The **protective**
**layer** is a glassy or amorphous material that conducts ions
of the active metal. It may be deposited on a releasable web
carrier or other substrate such as polymer electrolyte layer.
Lithium is then deposited on the **protective layer**
. Finally, a current collector is attached to the lithium.
IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(**protective layer** contg.; encapsulated
lithium **electrodes** having glass **protective**
**layers** and method for their prepn.)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |

| | | | |
|---|---|---|---|
| P | | x | 7723-14-0 |
| Li | | x | 7439-93-2 |

IC ICM H01M004-02
ICS H01M004-04; H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **lithium sulfur battery anode** encapsulation
IT Secondary **batteries**
(**Li-S**; encapsulated **lithium electrodes** having glass **protective layers** and method for their prepn.)
IT **Battery anodes**
Encapsulation
Polymer electrolytes
(encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT Polyethers, uses
Polymers, uses
Polyphosphazenes
Polythioethers
(gel electrolyte contg.; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT Polyoxyalkylenes, uses
(gel or solid electrolyte contg.; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT **Battery** electrolytes
(gel; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT Imines
(polyimines, gel electrolyte contg.; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT 7440-02-0, Nickel, uses 12597-68-1, Stainless steel, uses
(current collector; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT 7439-93-2, Lithium, uses
(encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)
IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3,

Aluminum Lithium sulfide 236388-76-4, Lithium phosphide sulfide
(**protective layer** contg.; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses
(releasable web carrier; encapsulated lithium **electrodes** having glass **protective layers** and method for their prepn.)

L50 ANSWER 21 OF 22 HCA COPYRIGHT 2006 ACS on STN
131:146969 Plating metal **anodes** under **protective coatings** for use in **batteries**. Chu, May-Ming; Visco, Steven J.; De Jonghe, Lutgard C. (Polyplus Battery Company, Inc., USA). PCT Int. Appl. WO 9943034 A1 **19990826**, 40 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US3335 19990217. PRIORITY: US 1998-PV75017 19980218; US 1998-139603 19980825.

AB A method for forming lithium **electrodes** having **protective layers** involves plating lithium between a **lithium ion conductive protective layer** and a current collector of an **electrode** precursor. The **electrode** precursor is formed by depositing the **protective layer** on a very smooth surface of a current collector. The **protective layer** is a glass such as lithium phosphorus oxynitride and the current collector is a **conductive sheet** such as a copper sheet. During plating, **lithium ions** move through the **protective layer** and a lithium metal layer plates onto the surface of the current collector. The resulting structure is a protected lithium **electrode**. To facilitate uniform lithium plating, the **electrode** precursor may include a wetting layer which coats the current collector.

IT **7704-34-9**, Sulfur, uses
(plating metal **anodes** under **protective coatings** for use in **batteries**)

RN 7704-34-9 HCA
CN Sulfur (8CI, 9CI) (CA INDEX NAME)

S

IT **7439-93-2**, Lithium, uses
(plating metal **anodes** under **protective coatings** for use in **batteries**)
RN 7439-93-2 HCA
CN Lithium (7CI, 8CI, 9CI) (CA INDEX NAME)

Li

IT **184905-46-2**, Lithium nitrogen phosphorus oxide
(**protective layer**; plating metal **anodes** under **protective coatings** for use in **batteries**)
RN 184905-46-2 HCA
CN Lithium nitrogen phosphorus oxide (9CI) (CA INDEX NAME)

| Component | Ratio | Component Registry Number |
|---|---|---|
| N | x | 17778-88-0 |
| O | x | 17778-80-2 |
| P | x | 7723-14-0 |
| Li | x | 7439-93-2 |

IC ICM H01M004-04
ICS H01M004-12; H01M010-36; H01M010-40
CC **52-2** (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery** lithium **anode** plating; coating lithium phosphorus oxynitride **battery anode**
IT Primary **batteries**
Secondary **batteries**
(lithium; plating metal **anodes** under **protective coatings** for use in **batteries**)
IT Plastics, uses
(metalized, current collector; plating metal **anodes** under **protective coatings** for use in **batteries**)
IT **Battery anodes**
(plating metal **anodes** under **protective coatings** for use in **batteries**)
IT Glass, uses
(plating metal **anodes** under **protective coatings** for use in **batteries**)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-44-0, Carbon, uses 11126-12-8, Iron sulfide 12673-92-6, Titanium sulfide
(**anode** precursor, wetting layer material; plating metal **anodes** under **protective coatings** for use in **batteries**)

IT 7440-02-0, Nickel, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses 12597-68-1, Stainless steel, uses
(current collector; plating metal **anodes** under **protective coatings** for use in **batteries**)

IT 1313-99-1, Nickel oxide (NiO), uses 7446-09-5, Sulfur dioxide, uses 7553-56-2, Iodine, uses **7704-34-9**, Sulfur, uses 7719-09-7, Thionyl chloride 11099-11-9, Vanadium oxide 11104-61-3, Cobalt oxide 11129-60-5, Manganese oxide 12068-85-8, Iron sulfide fes2 12162-79-7, Lithium manganese oxide limno2 25233-30-1, Polyaniline 51311-17-2, Carbon fluoride
(plating metal **anodes** under **protective coatings** for use in **batteries**)

IT **7439-93-2**, Lithium, uses
(plating metal **anodes** under **protective coatings** for use in **batteries**)

IT 74432-42-1, Lithium polysulfide 236388-74-2, Lithium boride sulfide 236388-76-4, Lithium phosphide sulfide
(plating metal **anodes** under **protective coatings** for use in **batteries**)

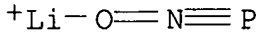
IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-75-3, Aluminum lithium sulfide
(**protective layer**; plating metal **anodes** under **protective coatings** for use in **batteries**)

L50 ANSWER 22 OF 22 HCA COPYRIGHT 2006 ACS on STN
121:61539 Protective lithium ion **conducting** ceramic **coating** for lithium metal anodes. Bates, John B. (Martin Marietta Energy Systems, Inc., USA). U.S. US 5314765 A **19940524**, 4 pp. (English). CODEN: USXXAM. APPLICATION: US 1993-137285 19931014.

AB In a battery including a cathode, a lithium anode and an electrolyte between the anode and cathode, a thin-film of lithium phosphorus oxynitride is used to coat the anode and sep. it from the electrolyte. A preliminary layer of lithium nitride may be coated on the anode before the lithium phosphorous oxynitride is coated on the anode so that sepn. of the anode and electrolyte is further enhanced. By coating the lithium anode with this material lay-up,

the life of the battery is lengthened and the performance of the battery is enhanced.

IT **150272-61-0**
(lithium anode coating with)
RN 150272-61-0 HCA
CN Lithium(1+), (phosphorous nitride N-oxide-O)- (9CI) (CA INDEX NAME)



IC ICM H01M010-40
INCL 429194000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
IT Anodes
(battery, lithium, **protective coating** of lithium phosphorus oxynitride for)
IT 26134-62-3, Lithium nitride **150272-61-0**
(lithium anode coating with)